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THE

SUPPLEMENT

TO THE

CYCLOPÆDIA OF INDIA

ASTERN AND SOUTHERN ASIA,

Commercial, Industrial and Scientific;

PRODUCTS OF THE

MINERAL, VEGETABLE AND ANIMAL KINGDOMS,  
USEFUL ARTS AND MANUFACTURES.

EDITED BY

EDWARD BALFOUR, L. R. C. S. E.

SURGEON, MADRAS ARMY.

MADRAS:

PRINTED AT THE SCOTTISH PRESS,

BY L. C. GRAVES.

1858.

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SUPPLEMENT  
TO THE  
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AND OF  
Eastern and Southern Asia.



(The abbreviations C. of I. and of C. of I. S. signify the Cyclopædia of India and Cyclopædia of India Supplement).

ABELMOSCHUS ESCULENTUS.

(1) ABELIA RUPESTRIS. This was amongst the plants which were nearly destroyed in the fight between Mr. Fortune's servant and the natives. There were also several fine roots of *Campanula grandiflora*, which grows wild amongst these hills, and this new species of *Abelia* (*Abelia rupestris*). Both ultimately arrived safe in England and are now in the garden of the Horticultural Society at Chiswick.—*Fortune's Wanderings*, page 28.

(2) ABELMOSCHUS ESCULENTUS.

This plant is remarkable for the similarity of its name to the vegetable called Ochra by the Greeks, but which has not been ascertained by botanists. The names by which this produce of the New World is distinguished in the works of Marcgrave and Piso are Quingambo and Quigombo, and in the later works by that of Gombo and Gombaut or Gombeau. It is possible, therefore, that a classical name which was not otherwise engaged may have been applied to a new vegetable, and, as has been the case in many instances, without any attempt being made to identify the plant named with that which had been described by classical authors. This plant is the *Hibiscus esculentus* of authors.—*English Cyclopædia*, page 60. The okra plant of the Southern States of America, as universally abounds in the Tenasserim Provinces, and all over the East, as it does in the West Indies.—*Mason. Abelmoschus Esculentus*, known in America as the Okra or Gumbo, is much cultivated there. In Louisiana, Gumbo soup is an epicurean dish. The ripe seed if allowed a sufficient age before using and carefully parched can with difficulty be distinguished from genuine coffee.—*Ag. Rep. from American*

ABIES.

(3) ABELMOSCHUS MOSCHATUS.

(MUSK HIBISCUS). *Syn.* *Hibiscus Abelmoschus*. Dancer states the seeds to be emeticus, but Dr. O'Shaughnessy had not found this to be the case in his experiments.—*O'Shaughnessy*, page 217. One of the most gaudy flowering shrubs in Tenasserim, is this musk plant, whose large yellow blossoms with blood colored eyes are sometimes seen bedecking European grounds, and whose seeds have been said to be an antidote to snake bites.—*Mason*.

(4) ABIES. The Fir. *Abies*, in Botany, forms a genus of trees of the Coniferous tribe, well known for the valuable timber which is produced by many of the species. It was formerly considered a part of the genus *Pinus*; but modern botanists have made it a distinct genus. The English appellation is the saxon *furh-wudu*, fir-wood. From *Pinus* (*Pine-Tree*), *Abies* (the Fir-Tree) is obviously distinguished by its more pyramidal form, and by its leaves arising singly from around the stem, not by twos or threes or a greater number, from out of a membranous shrivelling sheath, as well as by the characters in the fructification above described. Its species form four natural tribes, of the first of which, the *Silver Fir* may be taken as the representative; of the second, the *Norway Spruce*; of the third, the *Larch*; and of the fourth, the *Cedar of Lebanon*. The genus of resinous plants called *Abies*, comprehend many forest trees of great importance; some of them, such as the *Larch*, the *Norway Spruce*, the *Silver Fir*, and the *Balm of Gilead*, are raised in the English nurseries, annually in the open ground, in large quantities for the supply of plantations there; others, such as the *Cedar of Lebanon* and the *Douglas Fir*, are



care, being usually kept in pots until they are finally committed to the earth in the situation they may be subsequently destined to occupy. All the species are propagated by seeds; they may also be propagated both by inarching and by cuttings; but it is found that plants so obtained are either very shortlived or stunted, unhealthy, and incapable of becoming vigorous trees. In some of the species, as the Balm of Gilead and the silver Fir, the scales of the cones readily separate from their axis, so as to render the extraction of the seeds a simple and easy operation; but in others such as the Larch and the Spruce Fir, the scales will neither separate nor open: in such cases it is necessary to dry the cones as much as possible, then to split them by means of an instrument passed up their axis and afterwards to thresh the portions so separated till the seeds can be sifted out. Like other resinous seeds these are perishable unless sown within a few months after the cones have been gathered; they will however, keep much longer in the cone than if separated; wherefore, they should always be imported in that state. None of the firs should be transplanted at a height exceeding three feet, for the reason last mentioned; and the Larch is the only kind that will remove advantageously even at this size. The spruce and its allied species may be removed more successfully when from a foot and a half to two feet high. To this there is no other exception than that of plants that have been constantly reared in pots, as the Cedar of Lebanon; these may be safely removed at any size, if the transplantation is carefully attended to, because their roots are uninjured in the operation. It should however be remembered, in finally planting out firs which have been always kept in pots, that it is absolutely necessary that their roots should be spread out among the earth as much as may be practicable without straining or breaking them; because, while in pots, they necessarily acquire a spiral direction, which they will not afterwards lose unless it is destroyed at the period of final transplantation; and, if they do not lose it, they are apt to be blown over by high winds, on account of their roots not having penetrated into the earth far enough in a horizontal direction to form the requisite stay to support the trunk and head. Where great importance is attached to the raising of the seeds of rare species of fir, it has been found a very beneficial practice to place them between two turfs placed root to root, the one upon the other, and to watch them till the seeds begin to sprout; they are then to be sown in the usual way, when every seed will usually succeed. No trees are more impatient of pruning than these. They exude, when wounded, so large a quantity of their resinous sap as to become weakened even by a few incisions; and if they have suffered many, they are long

before they recover from the effects. So great is their symmetry, and so uniformly will be their branches from under favourable circumstances, that it will rarely happen that a necessity for the use of the pruning-knife can arise. The great rule to be observed in their management is to allow them ample room for the extension of their branches; if this is attended to, their beauty is not only ensured but the rate at which they will form their timber will be a full recompense for the space they may occupy.—*Eng. Cyc.* page 15. All the species of Abies will grow in England, where the soil is light enough to suit them, particularly *A. Deodara*, the Cedar of India, *A. Cedrus*, the Cedar of Lebanon, and *A. Larix*, the common Larch, together with *A. balsamea*, the Balm of Gilead, *A. picea* the Silver-Fir, and *A. Webbiana*, the Silver-Fir of the Himalaya Mountains. The Cedar of Lebanon will grow well in a swamp.—*Eng. Cyc.*

The Pines of Sikkim received from Dr. Hooker frequent notices. He says that Abies Brunoniana, A. Smithiana, and A. Webbiana, with Larix Griffithii are the only pines whose woods are considered very useful; and it is a curious circumstance that, there, none produce any quantity of resin, turpentine, or pitch; which may perhaps be accounted for by the humidity of the climate.—*Fol. ii. p. 41.* At Choongtam in Sikkim, the yew appears at 700 feet, whilst, on the outer ranges (as of Tonglo), it is only found at 9,500 to 10,000 feet, and whereas on Tonglo it forms an immense tall tree, with long sparse branches and slender drooping twigs, growing amongst gigantic magnolias and oaks, at Choongtam it is small and rigid, and much resembling in appearance the English churchyard yew. At 8000 feet the Abies Brunoniana is found, a tree quite unknown further south. But neither the larch nor the *Abies Smithiana* (Khutrow) accompanied it. The yew spreads east from Kashmir to the Assam Himalaya and the Khasia mountains; and the Japan, Philippine Island, Mexican, and other both American yews, belong to the same widely diffused species. In the Khasia (its most southern district) it is found as low as 5000 feet above the Sea level. In descending from Nango in East Nepal, Dr. Hooker passed at first through rhododendron and juniper, then through black silver fir (*Abies Webbiana*), and below that, near the river, he came to the Himalayan larch; a tree quite unknown, except from a notice in the journals of Mr. Griffith, who found it in Bhotan. It is a small tree, twenty to forty feet high, perfectly similar in general characters to a European larch but with larger cones, which are erect upon the very long, pensive, whip-like branches. He adds, its leaves, now red, were falling, and covering the rocky ground on which it grew, scattered amongst other trees; It is called "Saar" by the Lep-



## ABIES BRUNONIANA.

ches and Cis-Himalayan Tibetans, and "Boingga-sella" by the Nepalese, who say it is found as far west as the heads of the Cusi river: it does not inhabit Central or West Nepal, nor the North-West Himalaya. The distribution of the Himalayan pines is very remarkable. The Deodar has not been seen east of Nepal, nor the *Pinus Gerardiana*, *Cupressus torulosa*, or *Juniperus communis*. On the other hand, *Podocarpus* is confined to the east of Katmandoo. *Abies Brunoniana* does not occur west of the Gogra, nor the larch west of the Cusi, nor funeral cypress (an introduced plant however) west of the Teesta (in Sikkim). Of the twelve Sikkim and Bhotan *Coniferae* (including yew, juniper, and *Podocarpus*) eight are common to the North-west Himalaya (west of Nepal), and four are not: of the thirteen natives of the north-west provinces, again, only five are not found in Sikkim, and, he adds, I have given their names below, because they show how European the absent ones are, either specifically or in affinity. I have stated that the Deodar is possibly a variety of the Cedar of Lebanon. This is now a prevalent opinion, which is strengthened by the fact that so many more Himalayan plants are now ascertained to be European than had been supposed before they were compared with European specimens; such are the yew, *Juniperus communis*, *Berberis vulgaris*, *Quercus Bal-lota*, *Populus alba* and *Euphratica*, &c. The cones of the Deodar are identical with those of the Cedar of Lebanon: the Deodar has, generally longer and more pale bluish leaves and weeping branches, but these characters seem to be unusually developed in English gardens; for several gentlemen, well acquainted with the Deodar at Simla when asked to point it out in the Kew gardens, have indicated the Cedar of Lebanon, and when shown the Deodar, declare that they never saw that plant in the Himalaya. —Hooker, *Him. Jour.*

(5) ABIES ARARAGI (SIEBOLD). Wood brown; used for various domestic purposes. —Eng. Cyc.

(6) ABIES BRUNONIANA, Semadong, the deciduous Silver Fir (*Pinus Brunoniana*, Wallich; *P. dumosa*, Lambert). Leaves flat, all turned one way, serrulate towards the points, covered beneath with a milk-white bloom. Cones terminal, erect, ovate, blunt, very small, with lax, ovate, very blunt scales.—Found in the northern parts of India in the provinces of Nepaul, Bootan, and Gossain Than. It is a tree 70 or 80 feet high, with a clear trunk of from 15 to 20 feet, and a spreading very branchy head. The wood is of bad quality, being liable to warp.—Eng. Cyc. This species is repeatedly noticed by Dr. Hooker; at one place he says that the wood of *Abies Brunoniana*

## ABIES DEODARA.

("Semadoong") is like the others in appearance but is not durable; its bark is however very useful. Stacks of different sorts of pine-wood were stored for export to Tibet, all thatched with the bark of *Abies Brunoniana*. In the dense and gigantic forest of *Abies Brunoniana* and silver fir, he measured one of the former trees, and found it twenty-eight feet in girth.—*Him. Jour.*

(7) ABIES CEDRUS, the Cedar of Lebanon Fir (*Pinus Cedrus*, Linnæus and Lambert). Leaves clustered, evergreen. Cones oblong, very obtuse, erect, with broad closely packed scales, which are a little thickened at the margin. Mount Lebanon and the range of Taurus are the native spots of this most stately and magnificent tree, which compensates for its want of height by its huge wide spreading arms, each of which is almost a tree in itself. According to Labillardière, a French traveller in Syria, the largest of those now remaining on Lebanon is at least nine feet in diameter. The trees are held in great veneration, and a holiday is set apart for the Feast of Cedars. Its growth is far from being so low as some imagine; on the contrary, the observations of those who have cultivated it with care prove that it will vie in rapidity of growth with almost any forest tree. Cedar wood has the reputation of being indestructible; instances have been named of its having been taken from buildings uninjured after a lapse of two thousand years. But it appears highly probable, from some interesting observations made at Tangier by Mr. Drummond, that the indestructible cedar wood was the beautiful, hard, deep-brown timber of *Thuja articulata*, the Sandarac Tree. The wood of *Abies cedrus* produces deal of very indifferent quality.—Eng. Cyc.

(8) ABIES DEODARA, the Sacred Indian Fir (*Pinus Deodara*, Lambert). Leaves evergreen, in clusters, acute, triangular, stiff. Cones growing in pairs, stalked, oval, obtuse, erect; the scales closely packed, very broad, and nearly even at the margin. It is a native of the mountains of Hindustan, near the town of Rohilkund, on the mountains of Nepaul and Tibet, at a height of 10,000 or 12,000 feet, and also in the woods of Almora. It is a large tree, with a trunk about four feet in diameter, resembling the Cedar of Lebanon, from which it differs in having its cones upon stalks, and its leaves longer and more distinctly three-sided, and also in the quality of its timber. The Hindoos are said to call it the Devadara, or God Tree, and hold it in a sort of veneration. Its wood is extremely durable, and so resinous that laths made of it are used for candles. Spars of it have been taken out of Indian temples, known to have been erected from 200 to 400 years, uninjured except in those parts which originally were



## ABIES WEBBIANA.

sap-wood. This tree has been extensively cultivated in England, and seems to be realising the favourable anticipations which were formed on its first introduction.—*Eng. Cyc.* See CEDAR DEODAR.

(9) ABIES KEMPFFERI (*Pinus Kämpferi*, Lambert). A native of Japan; found wild upon the mountains of Fako.

(10) ABIES MOMI (Siebold). Found in Japan. Its wood is in great estimation for its whiteness and fine grain.—*Eng. Cyc.*

(11) ABIES SMITHIANA, Seh, the Indian Silver Fir (*Pinus Smithiana*, Wallich). Leaves slender, four-cornered, whitish beneath, a little turned towards one side dark green, from one inch to one and a half long. Cones from four to six inches in length, erect, ovate-oblong, with obovate, rounded, even scales. A native of the slopes of the Himalaya Mountains. It is a tree of enormous size, with nearly opposite branches, covered with short down, and so arranged as to form generally two rows.—*Eng. Cyc.* This plant is repeatedly noticed by Dr. Hooker: at one place, he tells us that the spruce, (*Abies Smithiana*, "Seh") has white wood, which is employed for posts and beams. At another, he mentions that the beautiful Deodar was seen towering above the other trees, and, although all the specimens were comparatively young, they were yet striking and graceful. Near it was the *Abies Smithiana*. It had a dark and sombre appearance, yet it was peculiarly graceful, owing to its symmetrical form and somewhat pendulous habit. Again, he says, that towards Lamtang, in Sikkim the path left the river, and passed through a wood of *Abies Smithiana*. It is also called *A. Khutrow* and *Morinda*. Dr. Hooker had not before seen this tree in the Himalaya: it is a spruce fir, much resembling the Norway spruce in general appearance, but with longer pendulous branches. The wood is white, and considered indifferent, though readily cleft into planks.—*Hooker, Him. Jour.*

(12) ABIES THUNBERGII (*Pinus Thunbergii*, Lambert). A scarce plant in Japan.

(13) ABIES TORANO (Siebold)

(14) ABIES WEBBIANA, Webb's Fir (*Pinus Webbiana*, Wallich and Lambert; *Pinus spectabilis*, Lambert). Leaves linear, solitary, flat, all-spreading, and turned one way, silvery-white beneath, with a deep notch at the extremity. Cones oblong, erect, obtuse, with very broad, rounded, even scales. According to the account of Captain Webb, who first discovered it, this remarkable species attains the height of 10 or 20 feet, with a diameter near the ground of 3 or 4 feet. Its wood seems to be valuable. From what has been reported of its general appearance, it is probably one of the most interesting species that has yet been discovered. Inhabiting the colder regions

## ACACIA (RHEONJ).

of northern India, and found among plants which are more Siberian in their character than Indian, there can be no reasonable doubt of its being well able to withstand the rigour of the winters of England.—*Eng. Cyc.* Dr. Hooker tells us that, at Choongtam, the *Abies Webbiana* attains thirty-five feet in girth, with a trunk unbranched for forty feet.—*Hooker, Him. Jour.* As the subject of fire-wood is of every day interest to the traveller in these regions, he mentions that the rhododendron woods afford poor fires; juniper burns the brightest, and with least smoke, *Abies Webbiana*, though emitting much smoke, gives a cheerful fire far superior to larch, spruce, or *Abies Brunoniina*. At Dorjiling, oak is the common fuel; alder is also good. Chestnut is invariably used for blacksmith's charcoal, Magnolia has a disagreeable odour, and laurel burns very badly. The silver fir (*Abies Webbiana*, Dunshing) also splits well; it is white, soft, and highly prized for durability. The larch of Northern Asia (*Larix Europæan*) is said to produce a pungent, smoke, which Dr. Hooker never observed to be the case with the Sikkim species.—*Hooker, Him. Jour.*

(15) ABRESHAM, White silk, cut into very minute pieces; is used in Ajmere to remedy impotence: four tolas for one rupee.—*Genl. Med. Top. page 126.*

(16) ABROMA (from *a* and *βρῶμα* 'not fit for food,' in opposition to *Theobroma*, 'food for gods'), a genus of plants belonging to the natural order *Byttneriaceæ*. The species consist of small trees, with hairy lobed leaves and extra-axillary or terminal few-flowered peduncles at the tops of the branches.—*Eng. Cyc. p. 17.*

(17) ABRUS (from *αβρός*, soft), a genus of plants belonging to the papilionaceous division of the order *Leguminosæ*. The calyx is bluntly 4 lobed, with the upper lobe broadest. The legume is oblong, compressed, and 4-6 seeded. There is but one species, *A. precatorius*.—*Eng. Cyc.*

(18) ACACIA (Choukur) A species of silk tree Acacia. Choukur. *Hind.* A common low tree in many parts of Rajwarra. The flowers are long, cylindrical, one-half yellow, the other half bright pink and not mutable, the colored stamina exactly resembles tufts of floss silk: the wood is put to no use.—*Genl. Med. Top.*

(19) ACACIA (REWA) SACRED ACACIA.  
Rewa, *HIND.*

A large tree common in Rajwarra, sacred to the Matajee, around whose shrines groves of this tree are commonly found. The wood is hard, dark colored, and durable, but only the decayed trees are used.—*Genl. Med. Top.*

(20) ACACIA (RHEONJ). TRAVELLER'S ACACIA.

Rheonj, *HIND.*

A very common tree in particular parts of



## ACACIA SCANDENS.

Rajwarra, upon which travellers at certain parts of the roads suspend shreds of their cloths (as in other parts of India). To the extremities of the young branches are suspended innumerable masses of exuded sap of large size.—*Genl. Med. Top. p. 197.*

(21) **ACACIA ARABICA.** For Ordnance purposes, if properly seasoned, it would be found equal to any timber in use. The best mode of seasoning is to immerse the log when felled in a mud pit for twelve months and then to remove it to a drier spot till brought into use. It rarely exceeds 18 inches in diameter and is always crooked. Cattle eat the seeds, which if burnt yield the moochies a good black for paint.—*Rohde, M.S.S.*

(22) **ACACIA CATECHU.** *Willd.* A tree from 15 to 20, but sometimes 30 feet high, with hard and heavy wood, of which the interior is of a dark red or brownish colour, and the sap-wood white. Branches with stipulary thorns. Leaves bipinnate. Pinnæ 10 to 15 pairs. Leaflets 30 to 50 pairs; linear oblong, unequal and auricled on the lower side at the base; petiole angular, often armed in arid situations with a row of prickles on the under side, with one large urceolate gland below the lowest pair of pinnæ and smaller ones between the 2 to 4 terminal ones. Inflorescence a spike, 1 to 3 together in the axillæ of the leaves. Flowers numerous white. Calyx downy, 5-fid. Petals united into 5-fid corolla. Stamens numerous, distinct, double the length of the corolla. Ovary shortly stipitate. Style the length of the stamens. Legumes straight, thin and flat and smooth, with about 4—6 seeds. A native of the jungles and low hills of many parts of India—*Roxb. Corom. Plants, 11, t. 175.* quoted by *Royle, p. 350.*

### (23) ACACIA CINEREA.

• Ash coloured mimosa,	Werdil, HIND.
Eng.	Vedatil, TAM.
Vellatooroo, TEL.	

### (24) ACACIA EDULA. ESCULENT ACACIA.

Khôra. HIND.

A very common large tree in Rajwarra; the long slender pods are very sweet and pleasant food cooked: for this purpose, they are universally gathered by the poor wherever procurable and eaten both fresh and dried. The wood is very hard but the tree is not cut down.

### (25) ACACIA FERRUGINEA.

Rusty mimosa wood,	Keekur safeed, HIND.
Eng.	Vil velum, TAM.
Tella tooma, TEL.	

### (26) ACACIA SCANDENS: CLIMBING MIMOSA.

Gila. HIND.

A large creeper running over trees in the Kotah jungles, where the stems of this plant often in size and form resemble ship cables.—*Genl. Med. Top. p. 197.*

## ACANTHOPTERYGII.

### (27) ACACIA SERISSA,

• Mimosa Serissa	Vapamaram TAM.
Derisana, TEL.	Katoo vayh, Vriksha,
Serissa, BENG.	CAN.

This tree is very common in every part of India; all soils and situations seem to please it equally: it grows to be a pretty large tree but with a short thick trunk covered with ash-coloured bark. It has a very extensive but thin head. Flowering time the hot and rainy season, the greatest part of its leaves drop during the cold season. The wood of this tree is serviceable. The flowers are very fragrant, large masses of very pure gum are occasionally found upon it.—*Roxb.* This tree is occasionally found in avenues for which it is not well adopted, as it remains long without leaves, at the commencement of the hot season. The wood used to be employed for mallets wherewith to beat cloth when making it up in bales for the European market, it is also used for large screws and for fellers. Mr. Rohde discovered that prejudices exist to have induced some to under-value this wood, it is said to be unlucky and workman therefore decry it.—*Rohde, M.S.S.*

Seris grows at Ajmeer and abundant in Kotah: it is a beautiful tree with very fragrant flowers: the wood is valuable.—*Gen. Med. Top. p. 197.*

(28) **ACACIA STIPULATA**, is mentioned by Mr. Mason, as one of the trees of the Tenasserim Provinces. The fragrant acacia is indigenous in the Provinces, and is said to yield "a hard and strong timber." The largest timber tree belonging to the genus with which he was acquainted, is a common forest tree, and from the character of the genus would no doubt furnish valuable timber.

(29) **ACACIA SPECIOSA** *Syn. Mimosa Sirrisa.* This tree is easily recognised by its white flowers and long stamens; Wight says it attains a large size and is a common tree, frequent by road sides on account of the shade its large head affords. The wood is white, at least as compared with the kurry vaugay, but is very strong and durable: in trials it bore 563 lbs.—*Wight.*

(30) **ACALEPHÆ** (from ἀκαλήφη, a nettle), *Sea Nettles*, a class of marine invertebrate animals, belonging to the sub-kingdom *Radiata*. It is now made to include a large number of animals, of which the genus *Medusa* of Linnaeus, may be taken as a type.—*Eng. Cyc. p. 28.*

(31) **ACANTHOPTERYGII** (from ἀκανθα, a thorn, and πτερυξ, a wing), in zoology, one of the three primary divisions, or natural orders, of fishes. The fishes are divided into three orders, the *Chondropterygii* (from χόνδρος, cartilage, and πτερυξ, a wing or fin), or cartilaginous fishes, without a solid bony skeleton; *Acanthopterygii*, fishes, having bony skeletons with prickly spinous process in the dorsal fins; and *Malacopterygii*



(μαλακός, soft, and πτέρυξ, a wing), fishes, with bony skeletons indeed, but with soft articulated radii in the dorsal fins. These divisions were first employed by Willoughby and Ray. Cuvier divides the Acanthopterygious fishes into fifteen natural families, which he calls after the names of their typical or most common genera.—*Eng. Cyc.*

1. *Peroidæ*, including the common Perch, the Sea-Perch, the Barber of the Mediterranean, the Weevers, the Stargazers, and the Sea Pike.

2. *Triglidæ*, which include the Gurnards, the Flying-Fishes, the Bull Heads, the Miller's Thumb, and the sticklebacks.

3. *Scianidæ*, which include the Maigres, the Stone-Perch, the Drum-heads, the Red-Throats, and a number of other fishes less known.

4. *Sparidæ*, including the Sea-Breams, the Spanish Bream, the Gilt-Head, and Black Bream.

5. *Menidæ*, a small family whose species are not much known.

6. *Squamipennes*, including the Chætodons and other curious fishes, as the Coachmen, the Horsemen, and others.

7. *Scomberidæ* includes the Mackerel, the Tunnies, the Sword-Fishes, the Pilot, Pilot-Fishes the John Dory, and the king-fish.

8. *Tandidæ*, including the Scabbard-Fish, the Hair-Tail, Red-Band-Fish, and others.

9. *Theutyes*, including the Lancet-Fishes and some other genera remarkable for their powerful cutting spines.

10. *Anabadæ*, include the Climbing Perch and other allied freshwater fishes.

11. *Mugilidæ*, include the Gray Mullet, the Ramando of Nice, and some others.

12. *Gobioidæ*, include the Blennies, the Gobies or Sea Gudgeons, and the Dragonet.

13. *Lophiadæ*, include the Anglers, Fishing Frog, or Sea-Devil, and the Frog-Fishes.

14. *Labridæ*, include the Wrasses, or Rock-Fishes, the 'Old Wives of the Sea,' the Captains, and the Scarus.

15. *Fistularidæ*, include the Pipe-Mouths, the Snipe-Fish, the Sea-Trumpet, or Bellows-Fish.—*Eng. Cyc.* page 50.

(32) ACANTHUS. In modern botany *Acanthus* is a genus of herbaceous plants found in the south of Europe, Asia Minor and India, belonging to the natural order *Acanthaceæ*.—*Engl. Cyc.*

(33) ACANTHACEÆ, an order of plants belonging to the Monopetalous division of *Dicotyledons*. Its type is the genus *Acanthus*. The species are herbaceous or shrubby; they are extremely common in every tropical country. Many of the species are mere weeds; others bear handsome flowers with gaudy colours, but seldom with any odour; a very small number have been occasionally employed medicinally as emollients or diuretics. The stems of all the

species emit roots very readily from their tumid articulations; on which account gardeners universally increase them by cuttings of the full-grown branches. They are always easy to cultivate provided they are not kept in too cold or too dry a situation. The annual kinds freely produce seeds, by which they are readily multiplied. The most common genera are *Justicia*, *Acanthus*, *Kueltia*, *Thunbergia*, *Barleria*, *Eranthemum*, *Larkesteria*, and *Henfreyia*. (Brown's *Prodromus Floræ Novæ Hollandiæ*; Barthing's *Ordines Naturales*; Lindley's *Introduction to the Natural System*; and Nees von Esenbeck's *Exposition*, in the third volume of Dr. Wallich's *Plantæ Asiaticæ Rariores*.)—*Eng. Cyc.*

(34) ACANTHOPHIS (from *ακανθα*, a thorn and *οφίς* a snake) in zoology, a genus of venomous serpents, allied to the vipers, but distinguished by having a single series of plates beneath the tail, except towards the very extremity where they are, in some cases, separated into two small rows. *Eng. Cyc.*

(35) ACARIDÆ, a division of *Arachnida* which comprehends the small spider like animals popularly termed Mites (*Acar*), as well as Water Mites and Ticks. Some of these are wanderers on land or in water; others are fixed upon various animals, whose blood or humours they suck, and even insinuate themselves beneath the skin, and often multiply prodigiously.

The Domestic Mite (*Acarus domesticus*, De Geer), is very commonly found in collections of insects and stuffed birds, and is exceedingly destructive to cabinets. Camphor has some effect in destroying this pest, but is not powerful enough to prevent it altogether. Moistening the specimens with a weak solution of corrosive sublimate, is said to prove an effectual preventative.

The species found in flour and on food is called *A. Farinæ*.

The Itch Mite (*Acarus Scabiei*, Fabricius, *Sarcoptes Galei*, L.) is a microscopic animal, found under the human skin in the pustules of a well known cutaneous disease. It has a remarkable suctorial apparatus, by means of which it secures its hold under the epidermis of the skin, into which it has the power of penetrating. This animal is most effectually destroyed by sulphur; and indeed this is a specific for the disease which the *Acarus* produces.—*Engl. Cyc.*

The Sugar Mite (*Acarus Saccharinum*) is found in the West Indian brown sugar of commerce. Thirty-five out of thirty-six specimens examined by the analytical Commissioners of 'The Lancet,' bought in the shops of London in 1850, were found to contain these creatures.

The Red Spider of the hot-houses of England is the *Acarus tellarius*. It is the pest of hot-houses and green-houses. Though so small as scarcely to be seen by the naked eye, its effect on plants are very obvious. These creatures live



## ACONITUM.

upon the juices of the plant which they attack, and also present the function of the leaves from being properly performed. They are best destroyed by sulphur. The mode of applying it is to sprinkle the sulphur on the hot pipes or on plates; afterwards the plants should be syringed. Other species, as *A. hortensis*, *A. holosericeus*, *A. Geniculatus*, attack various plants, and the best way of treating them is the same as the above.—*Eng. Cyc.* page 52.

### (36) ACHYRANTHES POLYGONOIDES

Tooilkeeray, TAM.  
Chenchala koor, TEL.

Soonishunna, SANS.—*Ainslie's*  
*Mat Med.* page 254.

(37) ACIDS. For making these, natives of India have peculiar formulæ: their lemons and limes give them citric and the gram plant (*Oicer arietinum*) the oxalic acid.—*Royle Arts &c. of India*, page 463.

(38) ACIDUM BENZOICUM, Benzoic Acid, though named from Benzoin, is found in other substances, which are on this account called Balsams, such as Storax, and the Balsams of Peru and of Tolui. It is also produced by the action of reagents on several vegetable substances. Indeed, it is supposed by Prof. Johnston to be produced in the balsams themselves by the action of heat or other reagents.—*Royle*.

### (39) ACONITUM HETEROPHYLLUM.

The root of this plant has been long known in Indian medicine as a tonic and aphrodisiac. Mr. Heming, Sub Assistant Surgeon of Orai, has lately brought to the notice of the authorities, a substance passing under the name of Atees, which he has found to be an invaluable febrifuge, superior in many cases in his partial estimation to Quinine. The writer adds "I first saw this substance in the form of a fine white powder with an intensely bitter taste and from which a very bitter extract may be prepared. I have since seen the root from which it is procured, it is fusiform and occurs in single pieces with one extremity broken off, the largest I have seen is not more than an inch in length, the roots are grey outside and white internally with a very bitter taste. I believe they have not yet been thoroughly analysed. The true Atees is the root of Aconitum Heterophyllum which only grows in the Himalayas and Dr. T. Thomson mentions that the root sent here by Mr. Heming agrees with Dr. Royle's of that plant; but Captain Lowther says that Atees grows chiefly in the Deccan, especially in Guzerat, whence it is conveyed to Indore. It is procurable there with difficulty for 9 rupees the seer.

The true Atees is intensely bitter, slightly astringent, and with abundant farina, which is free from any noxious quality. There is a spurious substance resembling it but by no means of the same efficacy which Dr. W. O' Shaughnessy says

## ACORACEÆ.

he has reason to believe is the dried tuber of the *Asparagus sarmentosus*.

It is to be hoped that the question of the value of the substance used by Mr. Heming and the locality from which it is derived, will be soon determined. He deserves much credit for the zeal with which he has prosecuted the subject. The dose may be considered about 1 scruple three times daily, Mr. Heming has given 30 grains as often without any bad effect. I may mention that I have cured a few cases of slight fever in the College Hospital with 2 grs. of Atees three times daily, but it is questionable whether the cure was not attributable to the purgative or emetic given in the first place.—*Ind. Ann. Med. Sci. for Apl.* 1856 page 395.

(40) ACONTIAS (from *ἀκων*, a javelin), the name of a genus of serpents established by Cuvier, for the purpose of distinguishing certain species hitherto placed with the genus *Anguis*, or common snake. This genus is characterised by the absence of all the bones which represent the extremities in the genus *Anguis*, while it retains the structure of the head common to these animals and to the lizards, and has the body similarly covered with small scales only, without the horny plates which guard its under surface in the common serpents, and protect them from injury in the various rapid motions which they perform. The species of *Acontias* seem thus to afford a link between the common snakes and true serpents. As might naturally be expected from this conformation, the progressive movements of the species of *Acontias* are very different from those of common serpents. They do not glide along the surface like these animals, but boldly carry their heads and breasts erect; and if closely pursued defend themselves, courageously, and dart with the velocity of an arrow against their assailant. Though dreaded in their native countries, because confounded with their venomous congeners, these animals are perfectly harmless, and neither possess the means nor have the desire of being injurious. They have no poison fangs, and their cheek-teeth are so small as, in some species, to be barely perceptible. Their habits are gentle; and they are so timid that they generally fly at the least noise, or, upon the slightest appearance of danger, conceal themselves (under some shrub or tuft of grass, or even bury themselves under ground when no other refuge is at hand. Other species inhabit Asia Minor, Egypt and Persia; India and China have also their *Acontias*; and the Cape of Good Hope produces a species without eyes.—*Eng. Cyc.*

(41) ACORACEÆ, Lindl. (Nov. a tribe of Orontiaceæ.) A spadix naked and closely covered with flowers. Flowers surrounded with 6 scales. Ovary 3 celled, about 5 suspended ovules in each cell. Stigmas 3 lobed. Berries



## ACOTYLEPONS.

1 seeded (Lindl). The *Acoraceæ* are now made a tribe of *Orontiaceæ* by Dr. Lindley. (Veg. King. p. 194) and are like these allied to *Araceæ* many of which secrete much secula often united with acrid principle, but as the starch may be separated by washing, as in the case of what is called Portland Sago or Arrowroot, yielded by *Arum maculatum*, so the rootstocks of several form articles of diet in different countries.

—*Eng. Cyc.*

(42) *ACORUS CALAMUS*, Linn, L. E. Rhizoma L. E. or Rootstock of common Sweet Flag *Calamus aromaticus*, E.

The *Skopos* of the Greeks, the wuj of the Arabs, and buch of the Hindoos. It has no claim to the name assigned it in the L. P.

Rhizoma thick, rather spongy, aromatic like every other part of the plant. Leaves erect, 2-3 feet high about an inch broad, of a bright green colour. Stalk 2 edged or leaflike, but thicker below the spadix, which issues from one of the edges, about a foot above the root, 2 or 3 inches long tapering, covered with numerous thickly set, pale green flowers, characterised as in the family. Native of Europe and of moist and cool parts of India, also of North America. St. and Ch. 32. Nees von E. 24. The rhizoma, or creeping procumbent stem, which throws up leaves from its upper and roots from its lower surface, is flattened, jointed, or marked with the semicircular impressions of the leaves, of a light brownish colour externally, with a reddish tinge in the inside. The odour is strong and aromatic, but not very agreeable, the taste warm, bitterish, aromatic, and a little acrid. It contains Volatile oil, Resin, Extractive, Salts, woody fibre, and water.

*Action Uses.* Aromatic Stimulant. It has been as frequently prescribed in conjunction with bitters, as the Chiretta and Bonduc Nut, and with success as an Antiperiodic in Agues. In powder in doses of gr. x.—sc. j ; or in infusion (oz. jfs. —oz. ij.—j.—Aq.) in doses of oz. 1½.—*Royle.*

(43) *ACOTYLEDONES*, or *Acotyledoneæ*, the name of the first class in Jussieu's 'Natural System of Botany.' It is derived from the circumstance of all the plants which it comprehends vegetating and without the aid of the seed-lobes called cotyledons. Such plants are also in all cases destitute of flowers, and are in fact the same as what Linnaeus called *Cryptogamia*. They are also called *Cellulares*. —*Eng. Cyc.*

(44) *ACROGENS* (from *akpos*, the top-most, and *γεννᾶω*, to produce); in Botany, one of the primary classes of the Vegetable Kingdom, according to the Natural System. This class, with identical limits, is also known by the following designations:—

(45) *ACOTYLEDONS* (Jussieu), so named from the fact of the absence of cotyledons amongst this class of plants—*Exembryonata* (Richard), designating the ab-

## ACROSTICHON.

sence of any regular embryo in the reproductive cells, or spores.

*Cellulare* (De Candolle), denoting the general absence of vascular tissue and the prevalence of cellular tissue in these plants.

*Agamæ*, of various authors, implying the absence of the necessity of the union of two cells in order to reproduce a new individual.

*Cryptogamia* (Linnaeus), intended to convey the idea that if two cells were necessary to the reproduction of the new plant in this class, it was not obvious, as in the *menogamous* plants.

The *Acrogens*, as equivalent to the above expressions for the same class, embrace all those plants which are included in the above definitions. This term itself is, however, only applicable literally to those plants which, destitute of flowers, possess a stem growing in a manner distinctive from those called *Exogens* and *Endogens*. It has been thus restricted by Lindley in his 'Vegetable Kingdom,' and he places the stemless flowerless plants in another class, called *Thallogens*. The structure of the stem, however, is at best an artificial character, and the adoption of the terms for the classes expressive of its characters, has rather been accidental than necessary. On this account it is perhaps better to regard the *Thallogens* as a section of *Acrogens* than an independent and equal group.

The stems of *Acrogens* differ much in appearance from those of *Exogens* and *Endogens*. The wood is not secreted from layers of tissue, which have the power of reproducing regular Zones of wood, as in *Exogens*, or a regular arrangement of vascular and cellular tissue, as in *Endogens*. There is generally but a single ring of vascular bundles even in the ferns. These vascular bundles do not go on increasing in size, but are all developed together. The lower part of the stem does not continue to increase in size, and its growth is determined by the development of new vascular bundles in connection with the leaves of the point or upper part of the stem hence their name. In the Liverworts and Mosses there is only a simple vascular bundle in the centre of the stem. In *Isoetes* too, there is a ring of vascular bundles. Science is very deficient in good observations on the structure of the stem of these plants.—*Eng. Cyc.*

(46) *ACROSTICHON*, (from *akpos*, a point, and *στίχος*, a row) a genus of Ferns, most of which require in Europe, stove heat in cultivation. The whole of the species now referred to this genus are extra-European, being inhabitants of the West and East Indies, and Australia. Dr. Hooker mentions that one of the genus clothes the Betel Palms on the Megna, with the most elegant drapery. It is the *Acrostichum scandens*, and is a climbing fern with pendulous fronds. At another place he found parasitic Orchids growing



on the trees, which were covered with this climbing fern (*Acrostichum scandens*), so that he easily doubled his flora of the river banks before arriving at Maldah. — *Barker, Him: Jour. Vol: II. p. 338 and 351.*

(47) ACTINIADÆ, a family of Helianthoid Polypes, having for its type the old genus *Actinia* the *Sea Anemonies*. It has the following characters: Animal single, fleshy, elongate or conical, capable of extending or contracting itself, fixed by its base, but with the power of locomotion; mouth in the middle of the upper disk, very dilatible, surrounded by one or more rows of tentacula; oviparous and viviparous; marine. — *Eng. Cyc.*

(48) ACTÆA ASPERA is sometimes collected in China as the scouring rush is for cleaning pewter vessels, for which its hispid leaves well fit it. — *William's Middle Kingdom, p. 286.*

(49) ADANSONIA DIGITATA, ETHIOPIAN SOUR GOURD. Lin.

*Papara poollie pullum, TAMIL. | Bonnie Umbie, DUK.*

Its bark and leaves have been recommended by Du Chaissing, as a febrifuge. — *Ainslie, Ind. Ann. page 372, No. 6.*

(50) ADEN. In giving a "Sketch of the Geology of Aden, on the Coast of Arabia," Mr. Frederick Burr, remarks "it is not I believe generally known to English geologists, that we have now within the limits of the British dominions perhaps the finest example in the world of extinct volcanic action—I allude to Aden, our new settlement on the coast of Arabia, where I had an opportunity of spending a short time in the early part of the present year. Imperfect as the following description, the result of hasty examination, may be, it will still embrace a few principal facts respecting this interesting locality, and serve at the same time to direct towards it the attention it so well deserves."

The promontory of Aden is situated about eighty miles eastward of the Straits of Bab-el-Mandeb, in latitude 13° north; and it consists of a bold cluster of volcanic rocks rising into lofty and jagged peaks, which are connected with the main land of Arabia by a low sandy isthmus. The extreme length of the promontory may be about six miles, the breadth half as much. The loftiest and most prominent portions of the whole mass are volcanic, and the lower portions are partly volcanic also, but exhibit many beds of consolidated sea-sand, which have been more or less elevated above the general level of the ocean. The most interesting portion of the promontory is however an immense volcanic crater, which is situated at the extremity next the main land, and in the very centre of which the town of Aden with the British cantonment stands. This magnificent crater is nearly circular in form; its diameter is probably about a

mile and a half, and it is surrounded on the northern, western, and southern sides with precipices chiefly composed of lava, and rising from 1000 to 1776 feet in height, the latter elevation being that of the "Gebel Shunsam," a lofty range of volcanic peaks, which form the crater's western side. On the eastern side the wall of the crater has subsided or been broken down for about half a mile, thus allowing the sea to come almost close to the town, and forming a small bay, generally occupied by native Arab vessels. Still however the lofty and abrupt island of "Seerah," about the middle of the gap, serves as it were to connect the broken portions, and almost to complete the original circle of the crater. Northward of this great focus of eruption, and ranging to the extremity of the promontory, is an immense mass of lofty and jagged rocks, all composed of lava. They have indeed much the appearance of a cluster of smaller volcanic craters, the sides of which have been washed away to the eastward by the action of the sea; but on this portion of the promontory, I was able to bestow but a slight and hurried examination.

The interior of the great crater in which the town of Aden stands, presents almost a flat surface, and is not elevated very much above the sea-level, the volcanic orifice appearing to have been filled up so far, partly by the crumbling in of the sides, and partly by the matter which may have washed in from the sea. The crater itself, though at first sight almost perfect, has manifestly undergone some rude shocks, the effect of which are very apparent on examination. It has in fact been cleft entirely through in one direction and partially so in another; a great fissure ranges across it from north to south, and the two rents formed by it in the walls are called the "nothern" and "southern passes," the former of which being very important in a military point of view, as it affords the principal ingress, is strongly fortified. The western half of the crater stands entire, forming the "Gebel Shunsam," which, as already noticed, is 1780 feet in height, and has within it a curious ledge of rocks about half its own elevation, which I had not time to examine. The eastern half of the crater has evidently undergone a partial subsidence; as it does not rise to more than half the height of the western side, and it appears to have separated in two parallel lines at right angles to the great north and south fissure. It is on the line of these subordinate fissures, that the sea, as before noticed, has broken in, and between them stands the island of "Seerah," which, although left as it were without support on both sides, has itself very slightly subsided.

While viewing the grand disruptions of this great volcanic mass, which although of com-



manding altitude and several miles in circumference, has evidently subsided, like a cottage undermined by a neighbouring stream or river. I naturally looked back to the great catastrophes which had happened on the spot, and endeavoured to determine their nature. The volcano itself may probably have been submarine in the first place, and successive eruptions may have gradually elevated it above the level of the sea. After this its paroxysms appear to have become less violent, as otherwise the sides of so vast an orifice might have attained a much greater elevation than 1700 or 1800 feet. From the great subsequent subsidence on the eastern side, it would appear that in that direction the volcano had been gradually undermined, till at length it cracked from north to south, and the subsidence of the eastern half took place. This enormous mass, however, in subsiding, seems to have cracked again into three portions by fissures at right angles to the direction of the principal movement. The subjoined woodcut will render this explanation more clear, and make it better understood.

Such appearing to be a brief outline of the physical history of this volcano, the eruptions of which were probably accompanied by the throwing up of smaller cones to the northward, I shall now briefly advert to the various rocks which compose the promontory of Aden, and the phenomena they present. The rocks which I observed were the following:—A dark brown or chocolate-coloured lava, generally of a very cellular texture, which is by far the most abundant rock. It forms all the high peaks of the upper part of "Seerah" Island, and the bold cluster of rocks at the northern extremity, called the "Ras Marbel," and it in many places constitutes the whole mass down to the sea level. This enormous accumulation of lava is sometimes, especially on the east side of the great crater of Aden, separated in the middle by a very thick bed of greenish porphyry, having generally a slightly lamellar structure. This porphyry is itself interstratified with red ochreous beds, which occur also between it and the lava, and appear to be derived from either decomposed lava, or from showers of volcanic matter, afterwards converted into an ochreous clay. Near the "northern pass" I observed a curious granular rock, probably a volcanic breccia; but having lost the specimens I collected, I am unable to describe it with any precision. Apparently at the base of all the above rocks, there are in places, especially near the "northern pass," thick beds of slightly consolidated sea-sand, which seem by their diagonal stratification to have been drifted by opposing currents, and may probably have formed the bed of the sea, when this great submarine volcano first broke forth. In the northern part of the promontory, the flat

line of coast, between the volcanic peaks on the one side and the sea on the other, is evidently merely a raised beach, where the loose sea-sand is consolidating into a tolerably compact sandstone, owing to the action of a tropical sun upon the calcareous matter of the sand. This formation of recent sandstone is further interesting from its inclosing numerous existing shells and corals of the adjoining Arabian sea. As regards the stratification of the rocks here described, the porphyries and volcanic products have generally an inclination of about 15° from the crater, but in some places their position is irregular and contorted.

Independently of the great fissures and lines of subsidence before noticed, the volcanic rocks of Aden present numerous and striking examples of dykes raking through them like walls, and generally almost perpendicular. These dykes appeared to me to be chiefly filled with siliceous matter, and to be both harder and more compact than the adjoining volcanic rocks. The most prominent and remarkable of them is one near the "main" or "northern pass"; it is several feet wide, and has almost the appearance of a vast wall crossing the mountain. Other conspicuous dykes are seen in "Seerah" Island, cutting through both the beds of porphyry and lava. I observed in many places small veins of chalcedony intersecting the lava.

Some pieces of black and green obsidian from the volcanic rocks of this promontory were kindly given to me by Dr. Maholmson; but I did not see the places where they were collected, nor learn the circumstances under which they were found. The green obsidian is quite glassy in its texture, and in some of the specimens the colour is very pale. One piece is very interesting, the obsidian itself running in small veins to a coarse cellular trachytic rock, and suggesting the idea of materials of very unequal fusibility, having been exposed together to the intense heat of the volcano, the result being a segregation of the most fusible portions, and the melting of them into obsidian, while the adjacent refractory matter has undergone but little change.

The above hasty sketch of this interesting tract is given as an imperfect outline only; but should this port be abandoned, even these rough notes may become valuable, as no European could then visit this spot. Should, on the other hand, the settlement be retained, the present notice may attract the attention of future travellers who may have more leisure to examine the promontory of Aden. I would remark, in conclusion, that few contributions to geology would be more valuable than an examination not only of Aden but of the other volcanic groups, some of them as yet hardly extinct, which extend north-westward from that promontory through at least the southern portion of the Red Sea.—*Mr. Burr.*



(51) ADENANTHERA PAVONINA. The rose-coloured fruit of the "Mangrove" yields a beautiful deep red-colour, approaching purple; the wood of the *Adenantha pavonina* dyes red, and the wood of the black varnish tree affords a red dye.—*Mason*.

(52) ADENNMA MYSSOPIFOLIUM. Chota Chirayta, *Kind.* is common in various parts of Southern India, is very bitter, also somewhat laxative, and much used by the natives as a stomachic.

(53) ADIANTUM CAPILLUS VENERIS, or Venus' hair, is indigenous in the Himalayas, where it is called *shuer-ul-jin*, or fairy's hair. The names *Moobarkha* and *hungraj* are also applied to it, and like the European article it is given as an expectorant. In Europe it is the basis of the celebrated *Syrop de Capillaire*.—*O' Shanghnessy*, p. 677.

An *Adiantum* or maiden hair, a small handsome fern, is seen in Tenasserim, in the crevices of old ruins and walls everywhere, of the same genus and nearly resembling the English maiden-hair "the prettiest of all ferns."—*Mason*.

(54) ADRUK, GINGER; ZINGIBER OFFICINALE.

(55) ÆGAGRUS, a wild species of Ibex, called Paseng by the Persians. [Goat.]—*Eng. Cyc.*

(56) ÆGLE MARMELOS, (Corr.) Wight and Arnott, Prod. Fl. Pen. Ind. Or, I. 96, D. C. Prod. I. P. 538, Roxb. Cor Pl. 2, t. 143, Fl. Ind. 2. P. 579. Wight Icon, t. 16.

*Feronia Pellucida* Roth. Nov. Sp. P. 384.

*Cratæva marmelos*, Linn. Bilva or Mahura, Sir W. Jones. Asiat. Res. 2 P. 349. Ainslie, Mat. Ind. 2. P. 188.

*Covalum*, Rheede; Hort Malab. 3. t. 37.

*Bilanus* Rumph. Amb. I. t. 81; Plukenet, t. 170, f. 5.

Beal, Bel. or Bela, HINDEE | Maredoo, TELINGA.

AND BENGALÉE.

Beli, CYNGALESE.

Tanghula, MALAY.

Willa maram, TAMOOL.

Bengal Quince.

A tolerably large and erect tree, 20 to 30 feet high; bark ash coloured; branches few and irregular. Thorns axillary, in pairs, single, or none, very sharp and strong; leaves ternate middle leaflet petiolate, lateral ones almost sessile; panicles small, terminal and axillary; flowers large and white; berry large, subspherical, smooth, with a very hard rind, from 10 to 15 celled; the cells contain, besides the seeds, a large quantity of an exceedingly tenacious transparent mucus which on drying becomes very hard, but continues transparent: when fresh it may be drawn out into threads one or two yards in length, (and so fine as to be scarcely perceptible to the naked eye) before it breaks. Seeds from six to ten in each cell, oblong, a little compressed, woolly, attached to the inner angle

of their cell. It is a native of most parts of the East Indies, and is common about pagodas, as the natives have a deep reverence for this tree. The fruit of the Indian Bael has lately been employed at Madras and is found useful in chronic dysentery and diarrhoea; the tree has been propagated from indigenous seeds at the Agricultural Garden and young plants are in considerable demand. The conserve prepared by Mr. Pound, of Oxford Street, from half ripe fruits exported from Calcutta, has been imported to Madras by Messrs. Flynn and Co. Eaten as marmalade, it is serviceable in relieving irritation of the mucous membrane and the pulp is much used by the natives for its astringent qualities. The late lamented Dr. Pereira, has given a short notice of this plant and its medicinal products, in the Pharmaceutical Journal vol. X. p. 165, and Dr. James Ranauld Martin writes "On what the curative property depends, I know not; it is certainly not astringent to the taste, or (at all events) very slightly so, I am inclined to believe that much of its efficiency may reside in the thick mucilage which surrounds the seeds of the fruit. A singular property of the fruit is this, that it does not merely restrain undue action of the bowels, as in diarrhoea and dysentery, but also in cases of obstinate habitual constipation acts as a mild and certain laxative. It may be said in all cases to regulate the bowels: *Lancet*, July 1853 p. 53. Dr. Horsfield states that, in Java, it is considered to be possessed of astringent properties (*Trans. Bot. Society*, vol. 8, p. 25) and the same property is mentioned by various other learned authors of the last two centuries as Burmann, Bontius, Garcias ab Horto and Caspar Bauhin. It is remarkable that the properties of a plant so easily procured, and so often sent to Europe, a plant figured by Plukenet, Rheede and Rumphius and subsequently represented in the standard works of Roxburgh and Wight should still be considered sub-judice. The properties of the Bael fruit in relation to the animal body appear to be nutritive, refrigerant and astringent—the two former properties are shared by almost all the fruits of the aurantiaceæ and the astringent principle may be a modification of Tannin, as stated by Pereira, or it may be owing to the large quantity of cohering mucus in the pulp of the fruit. I have found both the Conserve and the Liquor Belæ as prepared by Mr. Pound, of Oxford street, very useful in five or six cases of obstinate diarrhoea and in the person of a young officer from Burmah who suffered from great irritability of the mucous membrane after the expulsion of Taenia by Kousso. The conserve was spread upon bread like marmalade, and the Liquor Belæ was given in doses of two table spoonsful three times a day. My experience of the therapeutic effects of this remedy has been but limited, as much of the fruit is not at com-



## AGAMA.

mand in Madras, but I feel confident that I have observed the astringent and refrigerant effects of the pulp which in my opinion, possesses remedial properties of considerable value. The testimony of the eminent authorities quoted above, added to the experience of Mr. Sanderson and other Indian practitioners of the present day will, I trust, set at rest the question of the medical efficacy of the Bael fruit.—*Dr. Cleghorn, in Indi: Anna. Medi. Science, page 222, 1854.*

### (57) "AESCHYNOMENE ASPERA." Shola, HIND.

Shola is advantageously used for making models of Temples, Houses, &c. which possess all the appearance of ivory. Beautiful specimens of these are manufactured at Trichinopoly.—*M. E. Jur. Rep. of 1855.*

### (58) AESCHYNOMENE SESBAN.

Kedagu, RHEED | Sovinda, TEL.

This small beautiful tree is in general found in the vicinity of villages but is of few years duration; flowers chiefly during the wet and cold seasons.

There is a variety of this tree with yellow flowers which is not so elegant as the above described, and another with red flowers.

The wood is said to make the very best charcoal for gunpowder.—*Roxb. Rohde M.S.S.*

(59) AESCHYNOMENE PALUDOSA is the Sola, or light sponge wood of Bengal.—*O'Shaughnessy, page 295.*

### (60) AGALLOCHA WOOD. ALOE WOOD.

Eagle Wood, ENG. | Kalambak, Gahrn, Kayu.  
Agarhu, SANS. | MALAY AND JAVANESE.

See EAGLE WOOD.—*C. of I.*

(61) AGAMA, in Zoology, a genus of reptiles belonging to the order *Saurians*, and family *Iguanians*, of Baron Cuvier. In the form of their heads and teeth the species of *Agama* resemble the common lizards, but differ in the imbricated scales which cover their tails. These animals have the body thick, and shorter in proportion than the generality of the saurian family; the skin is lax, and capable of being distended or puffed out with air at the will of the reptile; the whole body, as well as the head, neck, and feet, is covered with minute rhomboidal or hexagonal scales often prolonged in the form of little spines, and bristling when the body is inflated with air. The head is short, broad, and flat, particularly towards the occiput; the neck also is short, and the tail seldom longer than the body. These proportions give the Agamas much of the hideous and disgusting appearance of toads. Other species of this division having pores on the inner surface of the thighs, are the *Leiolepis* (*A. guttata* of M. Cuvier) of Cochinchina, with white rays and spots on a bright blue ground. And lastly the *Physignathes* (*A.*

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*coccineus*), from the Malayan Peninsula, remarkable for its large size, uniform blue colour but more particularly from being one of the very few species of saurian reptiles, which feed upon vegetable substances. Barot Cuvier assures us that it lives entirely upon fruits and nuts. The *A. calotes*, of a bright blue colour with transverse white marks on the sides, from the Molucca Islands. The *Lophyres* (*A. gigantea*, Kuhl), with a crest of long-elevated spines on the neck; and the *Lyriocephalus* (*A. acutata*) which has a similar elevated crest along the back, and the tail keel-shaped. This latter species, in many respects a most singular reptile, inhabits Bengal, and lives upon fruits.—*Eng. Cyc. p. 87.*

(62) AGARECUS ALBUS, AGARICUS MUSCARIUS,—now but little used in Europe, but the Eastern doctors continue to employ it as much as in former times. For instance, in indurations of the liver or spleen, ague, epilepsy, bilious and mucous disorders, stoppage of urine and menstrual discharge, pain from the stings of scorpions, etc. They conceive that it may be injurious to the stomach, and to the bowels, provoking colics and even apoplexy.—*Honigberger, p. 223.*

(63) AGATHOTES, (from *ἀγαθός*; goodness), a genus of plants belonging to the natural order *Gentianaceæ*. It is distinguished by having a rotate 4-parted corolla, with two pores at the base of each segment. *A. chirayta* is a well-known species, a native of Nepaul, Kumaon, and the Himalayas. The specific name is an imitation of the Sanscrit and Bengalee names. This plant has been known for a great length of time as a remedy in India, but has only recently been introduced into European practice. It is an annual plant, about three feet high, flowering in the rainy season. The whole plant is taken up, and the proper time for collecting it is just when the flowers begin to wither. When dried it has an intensely but agreeable bitter taste, and is destitute of aroma. The root is possessed of the greatest bitterness. The bitter principle is readily imparted to water and to alcohol.—*Eng. Cyc. p. 92.*

### (64) AGRICULTURE AND GARDENING.

Khet Karn, HINDOOE. | Zarayat, PERS.  
Khetec Barea, HIND. | Pairoodagaradoo, TAM.

As the ground was, by Divine appointment, to furnish subsistence for man, and after his fall he was doomed to procure it by labour, husbandry, or the practical part of agriculture, was of necessity the first and most important occupation of the descendants of Adam; wherefore we learn from Scripture, that his two sons, Abel and Cain, were both employed in this manner, the former being a keeper of sheep, and the latter a tiller of the ground. With what implements this work of tillage was carried on, and what de-



gree of art was employed in producing the fruits of the earth, is left to conjecture; but writers on those early periods are generally agreed that the antediluvians were in possession of many arts and inventions which were in process of time lost, or at least but imperfectly retained among the different nations that were scattered abroad after the confusion of tongues. Agriculture was one of the arts which Noah and his posterity retained; for we find that he cultivated the vine. Those of the line of Shem appear to have followed the breeding and feeding of cattle: but those of the line of Ham, who took possession of Egypt, applied themselves to the tilling of the ground, and with so much ingenuity, industry and success, that, owing to the inundations of the Nile, and the consequent fertility of the soil, Egypt was enabled in the time of Abraham, and still more so in the time of Joseph, to supply its neighbours with corn during a period of famine. Nor were the inhabitants backward in assisting the liberality of nature: they busied themselves in embanking, irrigation, and draining, in order to derive all the benefits which the benignant river was capable of affording them. These works are said to have been carried on with particular spirit under the auspices of Sesostrius, 1800 years before the Christian era. So sensible were the Egyptians of the blessings which agriculture afforded, that in the blindness of their zeal, they ascribed the invention of the art to their god Osiris, and the culture of barley and wheat to their goddess Isis.

The Pelasgi, or aboriginal inhabitants of Greece, were among the number of those who lost all the primeval arts, and fed upon acorns and wild fruits, until they were led by the Egyptians, with whom they had an early communication, to the cultivation of the ground. Like them, too, they placed their benefactress Ceres, to whom they ascribed the introduction of corn, among the number of their deities; a goddess whom authors agree was no other than the Egyptian Isis. In the time of Homer, agriculture was in such esteem that King Laertes laid aside his royal dignity, that he might cultivate a few fields. Hesiod, the contemporary of this author, has devoted a whole poem to the labours of the field in the different seasons of the year. Of other writings among the Greeks, on agriculture, little remains, except a treatise by Xenophon on rural affairs, and scattered notices on the subject in the works of Aristotle and Theophrastus; but we learn from Varro, that there were in his time not less than fifty Greek authors to be consulted on agricultural matter.

The Jews, as Scripture informs us, applied themselves, when they came into the land of Canaan, to the cultivation of the soil, having each their territory allotted to them. We may

also infer, from the frequent allusions to this subject to different parts of the Old Testament, that husbandry formed their principal occupation. The laws of Moses have, many of them, for their object the regulation of their flocks, their herds, and their fields. David cultivated his own land, having officers to take charge of his flocks, his herds, his camels, his asses, and his warehouses of wine and oil, &c. Elisha was in the field with twelve yoke of oxen when Elijah found him. Besides the frequent mention of husbandry business in different parts of the sacred writings, as the digging of wells, the planting of vineyards, the leasing, gathering in, threshing, sifting, and winnowing of corn, with a number of other things of the like kind.

That the Carthaginians did not neglect agriculture is evident from this, that they had writers on the subject; of whom a famous general, Mago, was one, who is quoted by Varro. He wrote no less than twenty eight books. It is probable that, under the auspices of these people, agriculture flourished in Sicily, which was afterwards the granary of Rome.

No subject engaged the attention of the Romans more than agriculture, theoretically as well as practically. They divided their time between war and husbandry; their greatest men, in the early ages of the republic, being employed alternately in the one and the other. Cincinnatus was taken from the plough to fill the office of dictator; and Regulus besought the senate that he might return to his little farm for a short time, to prevent it from being ruined. Pliny observes, that the Romans ploughed their fields with the same diligence that they pitched their tents, and sowed their corn with as much care as they raised their armies. When riches had introduced luxury and artificial manners and habits, the labours of the field were performed by their slaves; but there remained many among them of the higher orders who directed their personal attention to the subject. The writings of Cato the Censor, Varro, Pliny, Columella, and Palladius, as well as those of the poet Virgil, abound with practical and useful observations on the whole ground of farming business. At the same time they all agree in lamenting that agriculture was not pursued with the same zeal as formerly. The great among the Romans had town houses as well as villas, and living more in the former than in the latter, the management of their farms was left to their bailiffs or servants. The ox, which was the principal beast of burden among the Egyptians, the Jews, the Grecians, was also highly esteemed among the Romans. Many directions for the breeding, breaking, feeding, and working this animal are to be found in the writers abovementioned, as also in regard to the management of bees, which were highly prized. As to the implements of husband-



ry used among the Romans, the description of them not being illustrated by any representation, it is not easy to speak precisely of them; but it is clear that they used the plough with and without wheels, with and without boards, with and without coulter, also with shares of different constructions. A reaping machine is likewise spoken of both by Pliny and Palladius, which was driven by an ox; but for the most part they cut their corn with the hand, either with the hook close to the ground, or only the ears with a curved stick and a saw attached to it, or otherwise they cut the stalks in the middle, leaving the stubble to be afterwards mowed. They threshed either with a machine composed of rollers, or with rods or flails, or they trod it out with their feet. Hay making was performed among the Romans much in the same manner as at present. Harrowing the corn was particularly recommended by the Roman writers; who also speak of hoeing, weeding, watering, draining, and fallowing the ground, which was universal among them.

Agriculture shared the fate of all the other arts on the decline of the empire: from the time of Pliny to the fifteenth century, there is no work extant on the subject, except the *Geoponics*, which was published by Constantine Pogonatus, and probably collected by the emperor himself. Crescenzo, a writer of Bologna, was the first who called the attention of his countrymen to this subject after this long interval. His little work, which was collected from the Roman writers, was followed by some other Italian productions, but probably nothing contributed more to give an importance to agricultural pursuits, than the introduction of the feudal system, which gave to every man a rank and distinction according to the quantity of land he either possessed or occupied; for not only the great lord, who was the owner of the soil, or reaped the fruits of it, but also his tenants, who cultivated it, were invested with political privileges that were enjoyed by no other members of the community; and altho' the feudal burdens and restraints have ceased, yet the privileges and advantages attached to the possession of landed property still give it a paramount advantage. Hence it is, that since the revival of the arts, the science of agriculture has been zealously cultivated by the higher orders. The writers likewise on this subject have within the last century been more numerous than at any former period; and every effort has been made by experiments, inventions, and improvements, to render the land productive. Nor have these efforts been without effect, for, notwithstanding the immense increase in the population, there has been no such scarcity as we read of in former times.

*Hints on the theory and practice of gardening.*

—A plant is a living being, like an animal requiring, for its continual existence, a constant supply of suitable nourishment, which it obtains by absorption from the soil in which it grows. This is effected through the pores or spongioles of the newly formed fibrous roots, which often extend to a great distance round the base of the stem, occupying a greater circle even than the branches. These pores are only permeable by fluid or gaseous matter, and nourishment must be presented in one of these forms before it can be admitted: to obtain therefore a small quantity of nourishment, a very large quantity of water must be absorbed.

Under the stimulus communicated by exposure to light and heat, the superfluous water thus introduced, is partly thrown off again, in form of perspiration, partly decomposed and converted to nourishment by the leaves, which, at the same time, by their vital powers, aided by the action of light, separate and assimilate the nutritious matters held in solution by the water, forming from them, the proper sap, whence all the various products of vegetation is derived.

While the functions of nutrition and exhalation balance each other, the health of the plant is preserved; if they become deranged, so that either is in excess, disease or modification of form results. On these few and simple facts nearly the whole of the complex system of Horticulture may be said to rest. If it is our object to obtain succulent vegetables, we excite great luxuriance of vegetation by planting in a light rich soil easily permeable by the most delicate fibres of the root, which, only, are furnished with absorbing pores, and give abundance of water or liquid manure, not confined to the foot of the stem only, but spread over a considerable surface, so as to make sure of supplying even the most remote spongioles with fluid. By this arrangement and free exposure to light, the leaves and stalks are greatly developed, and enabled to assimilate or throw off in form of perspiration the whole of the excess of moisture thus absorbed. But in a like proportion, the production of flowers and fruit if prevented, those buds, which otherwise would have been developed as flowers, are liable to push into leaves and branches. An opposite plan of treatment;—planting in a light poorish soil and giving little water, by diminishing luxuriance, has a tendency to produce an accumulation of nutritious sap, a deposition of wood, and in due season the free development of flower buds and fruits. Plants cultivated for their succulent leaves, such as all oleraceous vegetables, therefore, require the one method of treatment, those intended to supply flowers or fruit the other.

The equilibrium between absorption and exhalation may be temporarily greatly disturbed, without injury to the health of the plant, by changes



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in the state of the air : a dry warm atmosphere or windy weather producing copious perspiration, a humid and still one diminishing it. A knowledge of this fact is of great importance in transplanting, the success or failure of which often depends on attention to it.

**HEAT.** The effect of high temperature, the greatest enemy the horticulturist has to encounter in this country, requires to be more fully considered.

The extremes of temperature which plants are capable of bearing without destruction of vitality, has not been accurately ascertained, but it is known, that some seeds may be boiled and still vegetate, and some plants are found to endure the most intense cold known on the earth. Sir John Herschel observed the temperature of the soil of his bulb garden at the Cape,  $159^{\circ}$  Fahr. between 1 and 2 P. M. and found a seedling fir, of the years planting, quite healthy, while a thermometer buried four inches deep in contact with it, marked one day, (3d December) successively, between the hours of  $11\frac{1}{2}$  A. M. and 3 P. M. —  $148.2^{\circ}$  —  $149.5^{\circ}$  —  $149.8^{\circ}$  —  $150.8^{\circ}$  and  $148^{\circ}$ .

In India, so far as we have been able to ascertain, no similar set of observations has been made, but there is reason to infer, from known data, that when the subject is more attended to in India, the heat of the soil during our hot weather, will be found much higher than either of these observations indicate. We know, for example, that we never can get cabbages, cauliflowers, knoll-kolls, &c. to flower in the Carnatic, while at the Cape the saving of seed of these plants, as an article of trade, is constantly practised. Dr. Coulter mentions, that in South America, he had observed the temperature as high as  $140^{\circ}$ , but the circumstances in which the thermometer was placed is not mentioned, which leaves room to suspect the experiment was imperfectly conducted, as Mr. Foggo, of Edinburgh, succeeded in obtaining in July, at that place, with a large thermometer, having the ball covered with black wood, an indication of  $150^{\circ}$ . In India, it is probable a thermometer so prepared, or the ball simply blackened by being smeared over with mixture of gum, and lamp black, and suspended fully exposed to the sun's rays, would, at some seasons, indicate as a common occurrence a temperature perhaps a little short of  $200^{\circ}$ . In December it rises to  $130^{\circ}$ .

In repeating such observations it is desirable that treble sets of experiments should be made: one with the instrument freely suspended, to mark the temperature of the air, another having it simply in contact with the ground, to show to what extent the surface accumulates heat from absorption of the sun's rays, and the third set at 1 and 2 feet deep, to ascertain the mean temperature at the depth to which roots usually ex-

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tend. In the second set the thermometer should not be placed in herbage, as Mr. Foggo found another thermometer similarly prepared but resting on herbage indicate only  $119^{\circ}$ .

There are no want of registers of the thermometer in India but not a single observation, neither on the temperature of the soil, nor on the intensity of the sun's rays as received on the blackened ball of the thermometer, do we find any where recorded, though of such vast importance to the Horticulturist.

The first effect of heat on a plant, which has for some time had vegetation checked by exposure to cold, is to expand the air contained in its cells: its fluids become thinner, the excitability of its tissue is aroused, and perspiration commences, the effect of which is to bring into play the absorbing power of the root and thus set the whole machinery of vegetation in action. The degree of heat which different plants can sustain is very different: those of tropical countries require a temperature that would kill those of Europe, and when removed there soon perish from cold, even in the warmest weather, if exposed to the open air. When the temperature is permanently too high for a plant, it is over excited: if the atmosphere is at the same time moist its tissues grow faster than the vital forces of the plant are capable of solidifying them, its excitability is expended, the vital functions are deranged and a state of debility is brought on. Such plants are soft and watery, with thin leaves and with no disposition to produce flowers; a slight lowering of temperature, in this enfeebled state affects them more than in other circumstances, and the abstraction of light rapidly destroys them. But if the atmosphere is dry and the loss of fluid by perspiration is greater than can be made good by the roots, the secretions are elaborated faster than the parts to receive them can be formed, the old leaves dry and the young ones perish as fast as they are formed. From these statements, it appears, that high temperature with moisture, leads to the production of leaves and branches only, while with dryness, within certain limits, it is favourable to the formation of all kinds of secretion.

The effect of cold is to increase their excitability, that is, it renders them more susceptible of being acted on by the stimulus of heat. Heat by its stimulus diminishes excitability, and if long continued would exhaust it altogether. Nature provides against this result by the periodical fluctuations of light and heat of the day and night. During the day every part of the plant is strongly excited, and its powers of evaporation and assimilation most energetic. As evening advances and the stimulus of light and heat is withdrawn, the excitement subsides and reaches its minimum during the night. Plants therefore,



like animals, have their diurnal seasons of action and repose. During the day their system is exhausted of fluid by exhalation of aqueous fluid, and during the night, when perspiration ceases, the waste is made good through absorption by the roots.

The alternation of seasons seems intended to produce the like effects in a more extended manner. This is very evident in the temperate zones, where the cold of winter arrests vegetation for months together, and renders the plant so excitable that the rise of a few degrees of temperature in spring at once excites active vegetation. To this state of increased excitability is owing the injurious effects which often result from exposing young and tender plants to the rays of the morning sun. It is much less so between the tropics, but here also it is observable, as indicated by the fall of the leaf of some trees and the nearly total arrest of vegetation in most, during some part of the hot season.

This wonderful similarity of effects in living beings, originating in the action of opposite extremes of the same cause (heat) has not received the attention which it seems to merit from philosophers, and no satisfactory explanation has yet been given of it. Before indeed any explanation can be given, it is indispensably necessary that our observations, on the proportion usually borne to each other, by the temperatures of the earth and atmosphere, should be more perfect, for, considering the great importance of heat in the economy of plants this knowledge is, for the purposes of gardening, of the greatest consequence.

From observations made in Europe, it has been attempted to deduce the relative temperatures of the air and earth within the tropics. Thus it is ascertained, that in England the mean temperature of the earth is between two and three degrees higher than that of the air, the same ratio will probably be found to hold good in India. This inference is confirmed by one set of observations in New Grenada, the mean temperature of the air of which for the warmest month is about  $84\frac{1}{2}$  while that of the earth at one foot below the  $85^{\circ}$  during summer. According to this ratio, the temperature of the earth at Madras, during the months of November, December, January, February and March, should be between  $79\frac{1}{2}$  and  $81^{\circ}$ ; that of the valley of the Thames in July, one foot below the surface, has been found to be only  $64.81^{\circ}$ . So great an excess of bottom heat must exert a very injurious influence on plants fitted for the lower temperature, by over stimulating and exhausting their excitability, enfeebling their powers and thereby incapacitating them adequately to perform the functions of assimilation by which their food is converted into suitable nourishment. It is impossible in any way, so far to obviate these inju-

rious effects of excessive heat as to enable us to cultivate plants of colder climates in warm countries?

This is an interesting question to the tropical horticulturist, but cannot, we believe, in the present state of our knowledge receive a satisfactory answer. If with the view of affording plants of colder countries a lower temperature, we cultivate them under shade, we deprive them of light, the agent by the aid of which the vital forces of vegetation are enabled to decompose the water and carbonic acid, by which they are nourished, and carbon in a solid state formed. The quantity of carbonic acid decomposed being in proportion to the quantity of light which strikes the leaf, and the healthiness in proportion to the quantity decomposed, the healthiness should be in proportion to the quantity of light it received by day. This fact goes far to prove that we err when we endeavour to obtain a cooler climate by shading the whole plant, thereby depriving it of the light by the action of which it is enabled to assimilate its juices, in place of the soil only, a view which seems further confirmed by the result of Mr. Poggio's experiment of placing the thermometer on a grass plot, the evaporation from which reduced the temperature 30 degrees. For this reason it seems probable that we shall succeed better in raising early crops, by shading the soil and keeping it cool, while by liberal watering, we furnish a constant supply of moisture both for evaporation from the soil and for free perspiration by which the plant keeps down its own temperature.

The correctness of this inference was in some measure proved one season in the Madras Horticultural Society's Garden, the finest beet root of the season being raised in beds covered some inches thick with sand, which seemed to have the effect of preventing hardening from too copious evaporation, and preserving the soil below always cool and moist, though comparatively sparingly watered. On this principle it seems not improbable, the true cause of the vigour and luxuriance of melon plants in the hottest seasons, may be partly attributed to their abundant foliage, which, forming a dense shade, preserves the soil cool, whilst the copious evaporation from their large leaves, by keeping them cool, counteracts the heat of the solar rays to which they are exposed. One hot season some beds were planted with the sweet potatoe, the procumbent stems of which rapidly covered the soil as with a carpet: from that time they continued to grow luxuriantly through the whole season, without requiring a drop of water, apparently from the same cause, as the soil under them was kept moist, and found several degrees cooler than that shaded by trees.

The effect of high temperature on a plant is to stimulate and exhaust its excitability, and



enfeeble its powers of assimilation: the primary object in Indian horticulture is to prevent these effects by artificial means. At the present season (December 1846) observations made during fine clear weather with bright sunshine show that the thermometer, suspended in the open air, and freely exposed to the sun, indicates at sunrise a temperature of about 70, and at 2 P. M. from 120 to 130—at that high degree it is very unsteady) or a range of from 40 to 50 degrees in eight hours. The heat of the surface of the earth it is probable exceeds even the higher indication. The temperature of the air fluctuates rapidly, and it is probable that in immediate contact with a healthy plant the temperature never exceeds 90°. Not so the soil. It absorbs heat and parts with it very slowly, thereby maintaining a constant high temperature about the roots, keeping up night and day the stimulus and excitement by which the plant is enfeebled. The object of our recommendation is to prevent this accumulation of heat about the roots, and allow plants to enjoy a more perfect period of rest during the night.

*Moisture of the soil and watering.*—Water is one of the most important elements of the food of plants, partly from their having the power of decomposing it and appropriating its elements to their support, and partly as being the vehicle by which the soluble matters found in the earth are conveyed into the general system of the vegetables.

Plants will not live in soils nearly dry, and excess of water is in many cases injurious to them: it is therefore a nice point in horticulture to ascertain the amount most congenial to the species under cultivation. To determine this point, in tropical horticulture, is one of the greatest importance, and one which must engage much of the attention of every one who would attain perfection in the art. The native practice in the cultivation of nearly all garden produce is to water very liberally, by deluging the ground at least once every day with water. The propriety of this practice we have often heard questioned, but, notwithstanding, it is generally adopted. We should feel happy indeed could we lay down precise rules to guide our readers in this matter, and still happier could we feel justified in stating that, in the native practice, it is used greatly in excess, as irrigation is unquestionably by far the most troublesome and expensive division of Indian Horticulture. That it is often used in excess we are almost certain, that it is often employed injudiciously is about equally certain, but that copious supplies are absolutely necessary in the culture of extra tropical plants is quite indubitable, and must be given to ensure success. We have already shown that the effect of high temperature is to produce very copious perspiration from the surface of the

leaves, that during dry warm weather, the fluids are daily exhausted by exhalation, and replenished again by absorption during the night. To provide for this daily waste a moist soil is indispensable, and the lighter and more porous the soil the easier it is kept moist. This is easily explained: soils containing quantities of clay, after a few waterings become puddled on the surface, and quite impervious to water, so that the descent of it to the roots is prevented, and the plants suffer from want of water even when liberally watered every day. Sand is, perhaps, generally speaking, the best remedy for such soils, and is most easily applied by being spread over the roots, as it there performs the double function of keeping the soil below cool, and acting as an excellent conductor of the water. If we do not make sure, by occasional examination of the soil, that the water really does get to the roots by free percolation, we labour in vain in covering our beds daily with water, and if it does pass freely and the soil is shaded, daily watering is not required, except for very young plants, as at that age the perspiration is much more rapid than in older ones, and the absorbing surface of the roots smaller.

Carrots, turnips, beetroots, knoll-coles and cabbages should have a light soil, through which both the delicate roots and water, can pass freely. They should be sown and planted in rows. Turnips and carrots often succeed well, sown broad cast apparently because the leaves by shading the ground about them keep the beds cool. But they then labour under the disadvantage of being too thickly set, the soil between which is kept loose and permeable to water, and at the same time cool, by being covered with sand or some kind of litter. Thus managed it will never puddle and less than half the quantity of water will suffice, as much evaporation from the soil and the great accumulation of heat, which renders copious watering so indispensably necessary, will thereby be prevented. In Spain and Italy, it is much the practice thus to protect the soil from the heat of the sun.

Mildew, which is often produced by dry air acting on delicate vegetable tissue, is prevented in annuals by abundant watering. Mr. Knight applied this fact to the securing late autumnal crops of peas. Evaporation both from the soil and leaves is much augmented in windy weather, wind having the effect of increasing the dryness of the air. During the prevalence of such weather, therefore, the supplies of water ought to be more liberal, and gardens ought, if possible, to be invariably sheltered by high hedges, as well as traversed with lower ones, or with trees trained on ornamental trellises, as without such protection it is almost impossible to make annuals and young trees thrive in such weather. And in such seasons peas are peculiar



ly liable to mildew, so much so, that in some inland stations, where the air is very dry, it is almost impossible to procure a dish of peas, even during the cool season, in clear dry weather. Liberal watering, covering the soils between the rows, and sowing in well-sheltered situations would probably obviate this tendency to that disease. While copious moisture is thus indispensable to plants in this hot climate, stagnation of water about the roots is generally injurious, and requires to be prevented by deep digging, and when that is procurable a light absorbent subsoil.

While treating of moisture it may be well to observe that in seed sowing, the soil should be merely moist, just so much water as the particles of earth can retain around and among them by the mere force of attraction. In India, therefore pots or boxes in which seed are sown, should be filled with light soil easily percolated by water, placed in well-sheltered situations and covered to prevent, as much as possible, the rapid evaporation caused by our warm and dry climate. Irregular variations of heat, light and moisture, by which the process of germination is sometimes accelerated, sometimes retarded, should be particularly guarded against, as such irregularities are apt to destroy the young plant. In sowing seed of the plants of cold climates, in India, the temperature is generally higher than what is considered most advantageous in Europe, and probably leads to the loss of many, which either do not germinate or the young plants soon after die. An instance of this kind was lately communicated to us. Two parcels of Mignonette seed, one direct from Europe, the other saved in Bangalore, were sown at the same time. They both vegetated equally favourably, but the former all died off a few days after they appeared above ground, the latter still survive and are vigorous healthy plants. We have heard it asserted that the idea of acclimating either plants or animals is visionary, this case seems to lead to an opposite conclusion. Lettuce, turnip and carrot seed saved in Madras, were sown on the Neilgherries and were found to answer much better and produce much finer plants than those raised from English seeds, other portions of the same seed sown in Madras do well though they come far short of the Neilgherry result. Turnip and carrot seed saved at Hydrabad are found to answer better in Madras than those from Europe or the Cape. These few facts go far to prove that if Horticulture was more systematically pursued in this country much might be done towards acclimating northern plants.

*Propagation of Plants*—On this useful branch of horticulture much has been written, and many methods are in daily practice besides the one just mentioned by seed,—such as by

budding, grafting, eyes, cuttings, layers, &c nearly all these are pretty well understood in this country, and more or less practised, though probably not so much as they might be. The extreme heat and dryness of the climate during a great part of the year are however greatly against most of them as practised in Europe.

On each of these various methods it is not our intention on the present occasion to dwell, though some of them merit attention, but shall confine our observations to cuttings, which being easily practised is much employed among us, though with less success in many cases than we should experience if well conducted. Of this operation it is remarked, the constitutional differences among plants is so great that some species will strike without any difficulty under almost any circumstances, while there are others which no art has yet succeeded in converting into plants. And it is by no means uncommon to find that, out of a potful of cuttings of the same species apparently all alike, and treated in exactly the same way, one will grow and all the rest fail. From this it is inferred that the principles of striking cuttings are still imperfectly understood, and that this is one of the points of horticulture in which there is the greatest room for improvement.

The point requiring most attention in this operation is, to take the cutting from well ripened wood, if possible during the season of rest, after the formation of its annual ring of wood and ripening its annual crop of seed or fruit. Such cuttings cut square off, set in small pots with the end resting against the bottom, in light soil, consisting of a large proportion of sand mixed with vegetable earth slightly moist, and kept in a cool rather dark place under a glass frame, to maintain an equally humid atmosphere until they begin to shoot, are placed in the most favourable circumstances for propagation. Provided the cutting continues to live, it is an advantage its not immediately beginning to shoot, and only one bud should be allowed to grow. It is of importance that the end of the cutting should be cut parallel to, and touch the bottom of the pot; the lemon and orange and many other plants, which without this precaution do not strike willingly, will readily do so when this is attended to. The object of it is to prevent the cutting absorbing water too rapidly, before it is possessed of the necessary apparatus of leaves, to throw it off by perspiration. An ingenious plan was invented by Mr. Forsyth, to answer this purpose rather more perfectly. "He puts a small pot into one of larger size, having first closed the bottom of the former with clay; then having filled the bottom of the outer pot with corks, he fills up the sides with propagating soil in which



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the cuttings are so placed that their root ends (cut to the proper angle) rest against the sides of the inner pot, the latter is then filled with water which passes very slowly through the sides until it reaches the cuttings." (*Gardener's Magazine*) "In many cases, especially in striking such plants as heaths, gardeners employ a stratum of silver sand, placed immediately over the earth in which such plants love to grow; the cuttings are inserted into the sand, but so near the earth, that the roots, presently after the emission, find themselves in it and in contact with a source of food. This sand answers the same purpose as placing the root end of the cutting in contact with the pot, and is an ingenious device for doing that with small cuttings which cannot be conveniently done otherwise, except with large ones." (*Lindley*.) The additional precautions are to cut the root end close below a leaf bud, to facilitate the emission of roots by the buds, and cover the whole by a bell glass with the edge pressed into the earth, for the purpose of preserving a uniform degree of humidity in the atmosphere breathed by the cuttings.

*Potting.*—This is an important part of practical horticulture, but so little thought of by writers of works on practical gardening, that we have never seen printed rules for its management until we met with them in Dr. Lindley's late work entitled "The Theory of Horticulture" (a work which should be in the hands of at least every amateur); on this account we shall on this head quote largely from that work.

Without entering on an examination of the advantages derived from potting, it may be observed generally that the operation places plants in a very artificial and upon the whole unfavourable condition for attaining the highest perfection.

This is so obvious, even in the case of small plants, that but for its convenience in enabling us to shift plants from place to place, for ornaments or convenience, or transfer those raised from cuttings or seed to the open soil without injuring their roots, it would be much less practised. It also enables us to cramp the roots and diminish the tendency to form leaves, and thereby increase the disposition to form flowers, and finally, in the management, during their earlier stages, of delicate plants, it secures constant drainage from the roots.

To set against these benefits, one of the most obvious inconveniences is exhaustion of the soil by the plant. The organizable matter, in a soluble state, contained in a garden pot must necessarily be small, is soon consumed, and an unhealthy state induced. To remedy this, liquid manure and frequent shifting is had recourse to: it is to the latter, however, that we must principally look for renovating the soil, and restoring

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its permeability when consolidated by repeated applications of liquid manure, and thereby allowing more liberty of distribution to the roots. "It is not however, by mere exhaustion that potted plants render the soil unfit for their support. Every one knows that the soil of a farm will not bear year after year the same crop, but that one kind of produce is cultivated on a piece of ground one year, and is succeeded by some other, which practice constitutes the system of rotation of crops. It is notorious that a new apple orchard will not immediately succeed on the site of an old one, and that no amount of manuring will enable it to succeed. A wall border, in which fruit trees have been long grown, becomes at last insensible to manure, and requires to be renewed, and Dahlias do not 'like' the soil in which Dahlias were grown the previous year."

These phenomena cannot be explained on the principle of exhaustion of the soil, as that is made good by manure: it has therefore of late years been supposed that the *excretions from the roots* would account for the deterioration, and explain why plants cannot grow year after year in the same soil, this matter being assumed to be unsuitable to themselves, although harmless to different species.

On this theory considerable difference of opinion exists, but be the explanation what it may, the fact is certain, that to maintain plants in a healthy condition the soil must be changed, and explains why potted plants often shifted are more healthy than those treated otherwise. "It is not however merely for the purposes of removing deteriorated earth, or adding manure that shifting is important, all potted plants have in course of time their ball of earth, by the continual passage of water through it, reduced to a state of hardness and solidity unfavorable to the retention of moisture or the growth of roots, and this of course is cured by the operation of shifting if judiciously performed."

Another disadvantage which plants in pots suffer, is the exposure of their roots to great variations of temperature, owing to their invariably taking a direction towards the side of the pot; which, having reached, they do not turn back, but spread over its surface, till at last they form an entangled stratum enclosing a ball of earth. There they are in contact with a body subject to great variations of temperature and moisture according as it happens to be exposed to the sun, or to moist, or dry air in motion. The heat of the sun will, in such circumstances, be burning the roots on one side of a pot, while the cold produced by evaporation from its surface is almost freezing them on the other. To obviate this very serious drawback in potting plants, it has been proposed to use double pots of different

sizes, filling up the space between with moss or other substance retentive of moisture.

In pot planting it is essential to success that the drainage should be most carefully secured, by placing quantities of broken tiles or rough gravel in the bottom. As the tendency of the roots is always towards the sides of the pot, where they remain exhausting the small quantity of earth with which they are then in contact, and profiting nothing by the main body of soil, there is much nicety in the management required to prevent that, the principle of which is never to put a small young plant into a large pot at once; but gradually and successively transfer it to large pots as it advances in size. I shall conclude this, to florists, interesting division of these notes, by a rather long extract from Dr. Lindley's *Theory of Horticulture*.

"As the proper manner of managing potted plants is of the first consequence, I transcribe the following mode of treating the Balsam from a very sensible paper by the Rev. William Williamson.

"As soon as they have got four leaves, I transplant them singly in the smallest pots I can procure, and in such a manner that the stem of the plant may be covered somewhat more than it was at first, and then all are to be again placed in the frame. In a short time, if there be a sufficiency of heat, that part of the stem which is covered with the mould puts forth fibres by which nourishment is conveyed more immediately to the principal stem of the plant. As soon as the plants are a little advanced in growth, they are again removed (if possible without disturbing the earth) into somewhat larger pots, still planting them rather deeper than before. The same process is repeated five or six times, till, at last, they are removed into their final pots. I have found it best to give them their last removal after they have opened their first blossoms, as it gives additional brilliancy and size to the flowers. By following this method the plant acquires extraordinary vigour, throwing out its branches from the surface of the mould, exhibiting flowers nearly as large as a full blown rose, and a stem measuring two, and sometimes three, inches in circumference!" (*Hort. Trans.* III 128)

"The plan of continually sinking the stem with every succeeding potting, is useful to the Balsam, because it puts forth roots in abundance from its stem; and to all plants having the same property, the same practice is desirable: but not to others, which, if their stems do not root as fast as they are buried, will suffer injury by the sinking."

"It is by paying constant attention to the shifting of the growing plant, by the employment of a very rich stimulating soil, and by a thorough knowledge of the kind of atmosphere which suits them best, that have been obtained

those magnificent pelargoniums, cockscombs, balsams, and similar flowers, which have so often and so justly excited the admiration of even the most experienced gardener."

*Transplanting*.—The art of transplanting is among the most important business of the gardener, but the principles on which its success or failure depends, seem but imperfectly understood. Hence the discordance of opinion existing among writers on the subject. The following aphorisms from Lindley's first principles Nos. 40, 41 and 42, will explain in very few words what these principles are.

"40. Plants have the power of replacing spongioles by the formation of new ones so that an individual is not destroyed by their loss.

"41. But this power depends on the co-operation of the atmosphere and upon the vital powers of the species.

"42. If the atmosphere is so humid as to hinder evaporation, spongioles will have time to form anew, but if the atmosphere is dry, the loss by evaporation will be so much greater than can be supplied by the injured roots that, the whole system will be emptied of fluid before the new spongioles can form."

In these three propositions we have the key to this useful branch of the art. When a plant is taken out of the ground many of its roots are necessarily injured, and the remainder are less able to support the stem than before. This diminution of power will be in proportion to the degree of mutilation of the roots.

We have remarked above that plants have seasons of repose or inaction, and seasons of growth and activity. During the former of these, which usually happens in this country after the maturation of the annual crop of fruit, the demand on the roots is small, the fluids being stagnant, compared to what it is during the season of action when new leaves and shoots are forming, the flow of sap rapid and perspiration copious. The season for transplanting therefore is during the period of rest, as time is thereby allowed to form new roots and spongioles before that growth returns. For these reasons the best season for transplanting in Europe is immediately after the fall of the leaf, or in ever-greens, during wet weather, late in autumn or the beginning of winter. In this country these changes are not so well marked, as most of our trees are ever-greens and vegetation is always in progress, but by attending to the criterion furnished by the ripening of fruit we shall not greatly err. In Europe, damp or rainy weather is always considered advantageous, as the perspiration from the bark of deciduous trees and from the leaves of ever-greens is then least.

In the southern part of India we are seldom favored with such weather during the season of rest and cannot wait for it, as a fall of



rain is almost immediately followed by a renewal of growth. The most favorable time, therefore, for transplanting, is in still cloudy weather, and the plants transplanted should be immediately sheltered from wind, by being hedged in with bushes and shaded, to break the force of the wind and cut off the stimulating influence of the sun's rays. Still further to enable the mutilated roots to furnish the fluids required to counteract the effects of too free perspiration, the ground should be previously thoroughly soaked with water.

Next in importance to selecting a fitting season is the preservation of the roots of transplanted trees. Too much care cannot be bestowed on this division of the operation, as the former is of little consequence if the latter is neglected. Every minute fibre of the roots should if possible be saved, as it is by them alone that nourishment is taken up and as they are mostly produced at the circumference of the circle formed by the roots, the earth should be removed at some distance from the tree so as to ensure as many as possible being taken up entire. A convenient method of procuring a large supply of young fibres near the base of the stem is, either to dig a trench round the tree some months before removal by which all the principal roots are cut across, or to cut back the principal limbs, the extremities of which will emit abundance of fibres, which can then be removed uninjured in a moderate ball of earth. As the large roots when torn and bruised in the operation, are apt to lose their vitality and decay, and become the seat of disease that may ultimately destroy the tree, they should all be cut clean off when the wound will heal kindly.

These remarks are applicable to the transplanting of trees or shrubs: the same principles apply to the transplanting of succulent vegetables, which are usually transplanted two or three times to force them to throw out large quantities of fibrous roots and thereby augment their absorbing power.

In transplanting from pots or boxes into the open ground, for early crops of vegetables, the plot ought to be prepared for their reception by being first thoroughly moistened and cooled, which is effected by copiously flooding it daily, for two or three days before, and shading during the heat of the day, the same as if the plants were already there.

The practice of pruning trees when transplanted is one of doubtful propriety except to a limited extent. The reason of this is that the formation of roots depends on the healthy action of the leaves, and the renovation of the injured ones will be only in proportion to the healthy action of leaves and buds, their removal therefore is opposing an obstacle to this renovation. The danger to be feared is that the perspiration

of the leaves may exhaust the fluids faster than the roots can replace them. In such cases pruning is necessary, but should be sparingly practised and if transplanting has been well performed will not be required.

*On the saving of seed and acclimating plants.*—We mentioned above that some kinds of seed, saved in this country, give more certain and better crops than that brought from Europe, even though the latter was ascertained to be of good quality by the freedom with which it vegetated. This fact renders it desirable that attempts should unceasingly be made to procure Indian raised seed for use in India, as success in this operation holds out the only prospect of obtaining the long sought desideratum—constant supplies of good table vegetables. We also mentioned above, that to make plants flower and produce fruit it is requisite to store their systems with well digested nutritious juices: to effect this we must reduce their luxuriance by stinting their supplies of water, and giving them a poorer soil to grow in.

Any attempts to procure seed from European plants in this country, must be conducted on these principles, and with much care, as we have an almost, if not actually, insurmountable barrier to overcome in the heat of the climate, which, though it may not be such, as to prevent the plant arriving at perfection as a succulent vegetable, yet may altogether prevent its showing flower or maturing fruit. Such has hitherto been the case with our knoll-kolls, cabbages, cauliflower, celery, &c. though all seed freely on the Neilgherries. Not so however at Bangalore, the mean temperature of which is much below that of Madras. The failure at Bangalore is probably owing to imperfect management, and may ultimately be overcome, but until success has crowned their efforts and we are enabled to work with seed raised, in that comparatively warm climate, we can scarcely hope for success in the Carnatic, though that ought not to be a bar to our trying. With this view we would recommend, as the most probable method of attaining success that some of the best cabbages, knoll-kolls, &c., be transplanted into pots filled with soil composed of two parts sand, one part red loam and one part vegetable mould, and for some time watered with liquid manure, prepared by steeping dung in water, until they have recovered from the operation of transplanting. They should then be allowed to rest through the hot season, merely giving water enough to keep them alive until Oct. They might then be planted out and liberally watered for a few times with liquid manure, until they show signs of throwing up a flower stalk, when their supplies ought to be diminished, themselves protected from the monsoon rains, and the seed ripened in the course of the cool season. It seems probable

that many failures, even in Bangalore, must be submitted to, before we obtain good seed; but the object is well worth the trouble, and it seems even probable, that if we bring the subject to the notice of European gardeners they could lend us very important assistance by obtaining seed from the warmer countries of Europe, and growing a few plants raised from them in their hot houses, until they have ascertained that under the skilful management of the English gardener these plants can be made to produce seed in a tropical temperature, when we, whatever might have been the amount of previous discouragement would probably resume our experiments with renewed energy determined to succeed as well as they.

Here we bring our hints to a close: not however without expressing the hope that they may prove useful to a few at least of our readers and that some of these may be induced to favour us with communications explanatory of the results of their experiments, the better to enable us to correct, in future editions, any errors into which we may have fallen in this. Before finally concluding, we think it necessary to state, that nearly the whole matter of these hints is derived from the work several times referred to in the course of them; namely 'LINDLEY'S THEORY OF HORTICULTURE,' the object of which is to explain on Physiological principles, the principal operations of gardening,—a work of sterling merit, and as being the only one in which a lucid explanation of the principles of gardening is to be found, one which we would strongly recommend to the especial attention of all those desirous of becoming acquainted with the Philosophy of Horticulture, unencumbered with the verbose details of practise, too often erroneous, which constitute the bulk of most of the existing works on gardening.

For those desirous of obtaining practical details, applicable to Indian Horticulture, we would strongly recommend Mr. Speed's Handbook of gardening, recently published in Calcutta, and so favourably received there, that the first edition was exhausted in a few weeks. The printing of a second edition, with many improvements, we are happy to add, is already far advanced, and will, we believe, be published nearly as soon as these Hints.—*Madras Almanac*, 1841,

*Agriculture of the Chinese.*—In order to understand Chinese agriculture, says Mr. Fortune, a knowledge of the elements of the country is of course necessary. The dominions of the Emperor of China stretch over twenty-three degrees of latitude—from 18° north, and from the 98° to the 120° of east longitude, thus including both tropical and temperate regions in its vast extent. Being placed on the east side and forming part of the large continent of Asia, it is liable to extremes of temperature—to excessive heat in summer and extreme cold in

winter—which are unknown in many other parts of the world within the same parallels of latitude. One of our best writers upon China makes the following very sensible remarks on this subject:—"Although Peking is nearly a degree to the south of Naples—the latitude of the former place being 39° 54', of the latter 40° 50' the mean temperature of Peking is only 54° of Fahrenheit, while that of Naples is 63°. But the thermometer at the Chinese capital sinks much lower during the winter than at Naples, so in summer does it arise somewhat higher; the rivers are said to be frozen for three or four months together, from December to March; while during the last embassy, in September, 1816, they experienced a heat of between 90° and 102° in the shade. Now it is well known that Naples, and other countries in the extreme south of Europe, are strangers to such a degree of long-continued cold, and not often visited by such heats. "Europe," observes Humboldt, "may be considered altogether as the western part of a great continent, and therefore subject to all the influence which causes the western sides of continents to be warmer than the eastern; and at the same time more temperate, or less subject to excesses of both heat and cold, but principally the latter."

From my own tables, he continues, kept by Newman's best registering thermometers, I find that at Hong-kong, in the months of July and August—the two hottest months in the year—the mercury frequently stood as high as 90°, and one day at 94° Fahr. in the shade. The minimum was generally about ten degrees lower than the maximum. In the winter, from December to March, the thermometer frequently sinks nearly down to the freezing point, and sometimes, although rarely, snow has fallen at Canton and on the adjacent hills. The influence of the sea, however, in this part of the Empire, has a tendency to check the extremes of both heat and cold, but these are much greater in the northern interior. The northerly winds in the winter and spring months are severely cold in the south of China, indeed, I have suffered more from cold at Hong-kong and Macao in the month of February, than I have ever done in England.

At Shanghai, in the province of Keangsoo, in latitude 31° 20' north, the extremes of heat and cold are much greater than what we experienced in the southern provinces. Through the kindness of Dr. Lockhart, who kept up my meteorological tables during my absence in different parts of the country, I have obtained a very complete set of observations for nearly two years. From these it appears that in July and August the heat is the greatest, the thermometer in the shade sometimes standing for several days at 100° of Fahrenheit. The heat during these days was almost insupportable to Euro-



peas, who, when I was in Shanghai, were obliged to live in Chinese houses, which from their construction, were ill calculated to exclude the heat. In the end of October the thermometer sometimes sinks as low as freezing point. In the evening of the 28th of that month in 1844, the remains of the cotton and other tropical plants which are cultivated in the fields during the summer were destroyed by frost. December, January, and February are the coldest months in the year, the cold then being quite as severe as it is in the South of England. In the winter of 1844—45, the thermometer sunk as low as 26° Fahrenheit. On the night of the 18th of December and again on January the 4th the index was left at 24°. But that winter, according to Chinese accounts, was peculiarly mild, so much so, that the usual supply of ice could not be procured. In ordinary years the ponds and canals are frequently frozen several inches in thickness, and afford a plentiful supply of ice. I have therefore little doubt that in most years the thermometer may be found at least 20 degrees below the freezing point or at 12° of Fahrenheit, and perhaps even lower. Snow frequently falls, but the sun is too powerful to allow it to lie long on the ground.

If we except the extremes of heat and cold just noticed, the climate of Shanghai may be pronounced as fine as any in the world. Even the cold in winter is highly advantageous to the Natives, and still more so to Europeans and Americans, as it strengthens their constitutions and enables them to withstand the effects of the excessive heat. The months of April, May and June are delightful, and although the sun is hot in the middle of the day, in the afternoon the air is soft and agreeable and the evenings cool and pleasant. The autumnal months are generally of the same description, the wind then is cool and bracing and the sky is much clearer than in England. The sun, for days, and sometimes for weeks together, rises in the morning, runs his course and sets again in a clear and cloudless sky.

The prevailing winds blow from the South West from the end of April to the middle of September, during the remaining portion of the year they are northerly and easterly: thus forming what are called the South-west and North-east Monsoons. These monsoons blow with great regularity in the South of China, but are more variable towards the North. In the latitude of Chusan or Shanghai, although the monsoons prevail, the wind, not unfrequently, blows from other quarters. In the end of the summer season, that is from July to October, the country is frequently visited by those dreadful gales called by foreigners typhoons. The name, says Fortune, is a corruption of the Chinese word Ta-fung or "great wind." These storms commit the

most fearful ravages both by land and sea. The barometer gives warning some hours before the gale commences, and therefore, foreign ships can always send down their masts and yards, and if possible, remove to a safe anchorage. Where this is not to be had, they have the dreadful alternative of standing out to sea. The Chinese without the aid of the barometer, can tell when the Ta-fung is coming by the following signs. The wind, which blows from the South-west in the typhoon season, changes and blows from the North or North-East, becoming gusty and gradually increasing in strength, the sky lowers and looks wild, the sea rolls in upon the beach with a dead heavy swell, and every thing portends a coming storm. When these signs appear, the fleets of fishing-boats on the coast take their nets in, crowd all sail, and make for the shore as fast as they can, where the boats are hauled up on dry land or into some creek which is sheltered from the force of the winds and waves. The coasting Junks, which are ill fitted for bad weather, lose no time in getting into some sheltered part where they can ride out the storm in safety. And luckily, as a safeguard from the fury of these winds, nature has provided a great number of excellent well sheltered harbours on the coast of China, all of which are well known to the pilots who are employed on board the Junks.

During my residence in China, says this author, I witnessed two of these terrific gales—once at sea, and once on shore, luckily in the first instance, we were able to run into a deep bay, and with three anchors down rode out the gale in perfect safety. The other occurred on the 21st and 22nd August, 1844, when I was at Ningpo. I observed the Chinese running about in great consternation, and calling to each other that the "great wind" was coming, and to make preparations for it. Mats and rattan work, which had been placed over the doors and windows to afford shade from the sun, were hastily removed, and many of the houses, which were known to be in a weak state, were in a rapid way, propped up and strengthened. Nor were the husbandmen less busy in the fields. The heads of the tall millet, being nearly ripe, were quickly cut, and the long stalks left to be reaped at another time. Millet is so heavy when nearly ripe, that had it been left exposed to the wind it must have been dashed to pieces, and the crop entirely lost. Crops on the sides of the rivers and canals were removed; where it was possible to do so, otherwise, they would have been blown into the water and carried away far beyond the reach of their owners. All the fruit which was nearly ripe was hastily gathered from the trees, unnecessary branches were cut away, and others tied up and supported.

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The gale gradually increased in force until daylight on the morning of the 22d, when it seemed to be at its height. In Mr. Mackenzie's house, where I was staying at the time, we passed a fearful night. The wind howled and whistled round the roof, every blast seemingly more fierce than that which preceded it, until I really thought we should have the building down upon us and be buried in the ruins. At daylight the ~~rooms~~ presented a dismal appearance: all the floors, chairs, and tables were covered with dust and pieces of broken tiles and mortar which had been shaken out of the roof. As the storm still raged with unabated fury, Mr. Mackenzie and myself, glad to escape from the wreck by which we were surrounded, went out to see what effect the gale was producing on the other places in the vicinity. The wind was so powerful that it was next to impossible to keep our feet; in fact, we were frequently blown off the path and were obliged to scramble back to it again on our hands and knees. The river which is generally beautiful and smooth, had now risen and completely overflowed its banks, having been forced back by the strength of the wind and was as rough as the sea itself. The whole country was one vast sheet of troubled water for the branches of the river and the numerous canals by which it is intersected, had all overflowed their banks and had spread in the low paddy fields. Most of the small boats were safe, as they were either in sheltered creeks drawn up beyond the reach of the water, but many of the large wood-junks which frequent this port were not so fortunate. These had been moored off the city, having as usual, a large portion of their cargo lashed to their sides. In many instances, the combined force of the winds and waves snapped the lashings strong as they were, and the spars of wood floated from their sides, and were either carried away by the force of the stream or thrown on shore. Hundreds of the Chinese were now ready to seize the wood as it floated to land, and with a total disregard to the "rights of property" conveyed it at once to their own houses. No Mandarin or other Government officer interfered to prevent this, and the Chinese servants of the English Consul and other foreign residents actually brought a considerable quantity to the houses of their Masters, and seemed surprised when reproved for their dishonesty. The English of course honorably returned the spoil to its owners, much to the surprise of the Chinese.—*Fortune's Wanderings*, pages 276 and 284.

(65) AGAR-AGAR. *GRACILLARIA SPINOSA*. This is one of the Algæ, of the order Rhodophyta, and seems to have as synonyms, *Gigartina tenax* also *Gracillaria tenax* also *Fucus tenax* of Turner. Mr. Williams and the honorable Mr. Morrison say of the *Gigartina Tenax*, that the Chinese people collect

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this sea-weed on the coast to a great extent using it in the arts and also for food. The *Gigartina tenax* is prepared as affording an excellent material for glues and varnishes. It is boiled and the transparent glue obtained is brushed upon a porous kind of paper called "*shachi*" which it renders nearly transparent. It is also used as a size for stiffening silks and gauze, and extensively employed in the manufacture of lanterns and in the preparation of paper for lattices and windows. This and other kinds of fuci are boiled down to a jelly by the islanders on the south and extensively used for food, it is known in commerce under the name of *agar-agar*.—*Williams*, p. 275. The honorable Mr. Morrison says, *Gracillaria tenax*, is the *Fucus tenax* of Turner; about 27,000 lbs. are annually imported into Canton, from the provinces of Fokien and Tehi-Kiang, and sold for 6d. to 8d. the pound. The Chinese make it the basis of an excellent glue and varnish, and employ it chiefly in the manufacture of lanterns, to strengthen or varnish the paper and sometimes to thicken or give a gloss to silks or gauze. Mr. Neill thinks that the gummy substance called Chin-chou, or hai-tsai, in China and Japan may be composed of this substance. Windows made of slips of Bamboos and crossed diagonally, have frequently their interstices wholly filled with the transparent glue of hai-tsai.

(66) AGATHOTES CHIRAYTA (Don); *Ophelia chirayta*, (Grisebach); *Gentiana chirayta* (Fleming); Beng. and Hind. *Chirata*; grows in Nepal, the north of India, and Morung Hills. All parts of the plant are extremely bitter and are identical in composition with the common gentian. It is highly esteemed as a tonic and febrifuge all over India. The *Ophelia chiretta* is a common and abundant plant in the bazar, supplied chiefly by the lower ranges of the Himalayas.—*Dr. Cleghorn*. This well known Indian bitter is a common Burman medicine, but Mr. Mason had never seen the plant growing. It is considered a good substitute for cinchona, but it frequently acts as an aperient as well as a tonic. It is often confounded with another bitter, *kreet*,—*Justicia paniculata*.—*Mason*.

(67) AGATI GRANDIFLORA, Syn. *ÆSCHYNOMENE GRANDIFLORA*

Buka, SANS.	Basua, HIND.
Buka angusta, BENG.	Avesi, TEL.
Agati, TAM.	

Very common in India; the bark is said to be a powerful bitter tonic. The leaves are aperient.—*O'Sh.* p. 296. A small delicate tree, from twenty to thirty feet high, of only a few years duration. It is generally found in the vicinity of villages, where the natives encourage its growth, for the sake of the leaves and tender pods which they use in their curries. It is in flower and fruit most part of the year. The tree



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is employed for training the Betle plant (*Piper betel*) it admits the sun's beams, and the wind, better than any other of its height, being thin of branches and leaves, particularly after it is more than one year old. It is of a very quick growth, which is another reason for employing it. The wood is only fit for fuel. Cattle eat the leaves and tender parts.—*Rhode, M.S.S.*

(68) *AGLAI A ODORATA*. Amongst other plants worthy of notice cultivated by the Chinese are their cinnamon, the pretty *Aglai a odorata*, and *Murraya exotica*, both of which are very sweet scented and much cultivated by the Chinese.—*Fortune's Tea Districts, p. 7.*

(69) *AIIOO*. A soft, though fine, but not very close grained, light Ceylon wood.

## (70) ATMOSPHERIC AIR.

Air Atmosphérique. FR.	Atmosphärische Luft. GER.
Howa, ARAB. HIND. and	Ahvee, TAMUL.
PERS.	Agassium, TEL.
Bad, PERS.	

The Atmosphere, which everywhere surround the globe, extends to a height of 45 miles.

“ The vital air  
Pervades the swarming seas and heaving earths,  
Where teeming nature broods her myriad births;  
Fills the fine lungs of all that breathe or bnd,  
Warms the new heart, and dyes the gushing blood;  
With life's first spark inspires th' organic frame,  
And as it wastes, renews the subtle flame.”

It is an invisible gaseous body, devoid of odour and of taste, compressible, easily expanded by heat. Its Sp. Gr., according to the experiments of Sir G. Shuckburgh, is 0.01208 at 60° Fahr., and the Barometrical pressure of 30". But being usually taken as the standard of comparison for gases, it is then commonly reckoned = 1.100 Cubic Inches weigh 31.0117 grains, and its pressure at the level of the Sea is equal to 15 pounds upon each square inch of surface, or a column of air one inch square, and extending to the limits of the atmosphere, weighs about 15 pounds, or the same as a column of Mercury, also one inch square, but only 30 inches high, which it is thus able to balance and support by the pressure of its weight. This weight must necessarily vary at great depths, as well as at great heights, as a greater or less mass of air will be superimposed. Hence the Barometer is employed for measuring heights, a diminution of one inch being found equal to about 1000 (922) feet. From being compressible, its density necessarily varies at different heights, the inferior strata being dense, and the upper ones rarefied. The temperature also diminishes as we ascend into the atmosphere, at the rate of 1° F. for every 100 yards, or, more correctly, for every 352 feet.

Though apparently simple in composition, it is actually composed of two very distinct gaseous bodies, Oxygen and Nitrogen, and a small por-

## ATMOSPHERIC AIR.

tion of Carbonic Acid gas. The proportions in which these exist are:

Nitrogen gas	77.5 by measure,	75.55 by weight.
Oxygen gas	21 " "	23.32 " "
Aqueous vapour	1.42 " "	1.03 " "
Carbonic Acid gas	.08 " "	.10 " "

Omitting the aqueous vapour, which is variable in quantity, sometimes amounting, in hot countries, to as much as 2 per cent., the proportions of the permanent gases are stated by Humboldt, from experiments by himself and Gay Lussac, to be:

Nitrogen gas	- - - - 0.787 by measure.
Oxygen gas	- - - - 0.210 " "
Carbonic Acid gas	- - - - 0.003 " "

or, omitting the Carbonic Acid gas, 77 by weight of Nitrogen, with 23 of Oxygen, or by volume 79.2 of the former and 20.8 of the latter, in 100 parts.

The presence of Ammonia, in small quantities, has been detected by Liebig; and some Nitric is found also after thunder-storms. It has been imagined that some Hydrogen gas may exist in atmospheric air; and Muriatic Acid, it is said, has been detected in it at the sea-shore.

Dr. Murray has observed, that the Atmosphere may be regarded as a collection of all those substances which are capable of existing at natural temperatures in the aerial form, and which are disengaged by the processes carrying on at the surface of the earth. These, with other substances, as watery vapour, the effluvia from animals and vegetables, independent of Heat, Light, and the Electric fluid, form a vast mixture, the composition of which it is apparently impossible to determine.

Chemical Analysis has, however, proved that the various substances which may be mixed with the atmosphere quickly disappear, and are not to be detected by Chemical Tests, and that the composition of the air is everywhere uniform. It must, however, be admitted, that in very crowded assemblies of people, where there is a want of circulation, the quantity of carbonic Acid gas is a good deal increased. It was at one time supposed that the constituents of the Atmosphere were retained by Chemical Attraction. Dalton, however, promulgated the opinion, that they were mechanically mixed, that the particles of the same gases repel, but that the particles of different gases do not repel, one another; and that thus one gas acting as a vacuum to another, and each being repelled by its own particles, they become diffused. Professor Graham has ascertained that each gas has a diffusive power, or *Diffusiveness*, peculiar to itself, which is inversely proportional to the square root of its density.

The properties of Atmospheric air are a mean of those of its constituents, and its che-

## ALANGIUM DECAPETALUM.

mical actions are due to the oxygen; by this it is enabled to support combustion; also the respiration of animals, a portion of it being by them converted into Carbonic Acid. Fishes also depend upon its presence in the water, though this dissolves only a small portion of the air, but more of its Oxygen than of its Nitrogen. The processes of vegetation are also dependent upon the atmosphere, as it conveys water and also Carbonic Acid to the leaves of plants, where the Carbon becomes fixed, and the Oxygen again set free; and thus plants contribute to purify the air which might become deteriorated by the respiration of animals. As the atmosphere varies in the quantity of moisture it contains, so it assists in the distribution of water over the surface of the globe, and is, by its nobility, the principal agent by which the extremes of temperature are moderated. According to the temperature and moisture of the atmosphere, so is the rate of evaporation, and consequently of perspiration. Hence not only many pharmaceutical preparations require a knowledge of the constitution of the atmosphere, but some of the functions of the body must be influenced by its different states, and the operations also of some classes of medicines are modified by its different degrees of density and of dryness.—*Royle, Mat. Med. p. 22.*

(71) ACHEEN. This monarchy arose from the usurpation of Sultan Saleh-ood-din in A. D. 1521, previous to which time, Acheen had been a province of Pedir and governed by a viceroy from that kingdom.—*Journ. Ind. Arch.*

(72) AKAKIYA, A red stone brought to Ajmere from Delhie containing iron; is used as a tonic, in the dose of one tola; one seer for two rupees.—*Genl. Med. Top. p. 125.*

(73) AKHIREE CHAR SHUMBAH, A feast held amongst Mahomedans on the last Wednesday of their second month Saffur.—*Herklots.*

(74) AKUT CHOONI. Small rubies or garnets. Are brought via Pali to Ajmere and used as an aphrodisiac: one tola for two rupees.—*Genl. Med. Top. p. 125.*

(75) ALCEDO ISPIDA, THE KINGFISHER.

"The alcyon flew across the stream,  
And the silver brooklet caught the gleam.  
The glittering flash of his dazzling wings  
Was such as the gorgeous rainbow flings."

(76) ALANGIUM DECAPETALUM, Alangie

varum, *Alangieæ*, Icon. 194.

Alangie nullum அழிஞ்சிபழம். TAM.

Oodooghapundoo ஒதுகுபுண்டு. TEL.

Alangium decapetalum Vahl.

Aukota (Sans.) अंकुत. TER.

The wood of this small tree is said by Roxb. to be "beautiful" and when tried was found to

## ALGÆ.

sustain a weight of 310 lbs., but it wants size. Wight had never seen a tree that would give a 10 inch wide plank.

This fruit is eaten by the poor people.—*Ainslie, p. 221.*

(77) ALANGIUM HEXAPETALUM, Angoolam Rheed.

Karu angoolam, TAM. | Aarkanta, BENG.

A native of Coromandel, Malabar, and Bengal, flowers during the hot season, the wood is beautiful.—*Roxb. Rhod. M. S. S.*

(78) ALIAKOO. MEMECYLON TINCTORIUM.

(79) ALGÆ. ORDER, FUCACEÆ (ALGACEÆ, Lindl. Nat. Syst. p. 430.—Algæ, Juss. The Sea-weed Tribe. Of these leafless, flowerless water-plants, Wallich's Catalogue only enumerates two Indian species, borrowed from Buchanan's Herb. Royle mentions none, but says that Rottler's Herb. contains a few species of *Conferva* collected from the neighbourhood of Tranquebar.—*Voigt. Hort. Sub. Cul.* Dr. Hooker gives what the Rev. M. J. Berkeley, has written on the Indian Algæ which occur principally in different parts of the Himalayan Range, in the hot-springs of Soorujkoond in Bengal, Pugha in Tibet, and Momay in Sikkim; and on the Fungi of the Himalayas.

The Algæ from lower localities are but few in number, and some of them of very common forms. We have for instance from the Ganges, opposite Bijour, a *Batrachospermum* and *conferva crispata*, the former purple below, with specimens of *Chantransia*, exactly as they might occur in the Thames. The *Conferva*, or more properly *Cladophora*, which occurs also under various forms, at higher elevations, as in the neighbourhood of Simla and Iskardo, swarms with little parasites, but of common or uninteresting species. In the Bijour specimens, these consist of common forms of *Synedra*, *Meridion circulare*, and a *Cymbella*, on others from Dacca, there are about three species of *Synedra*, a minute *Navicula* and *Gomphonema curvatum*. Nothing, in fact, can well be more European. One splendid Alga, however, occurs at Fitcoree, in Behar, on the banks of nullahs, which are dry in hot weather, forming a purple fleece of coarse woolly hairs, which are singularly compressed, and of extreme beauty under the microscope, from the crystalline green of the articulated string which threads the bright red investing sheath. This curious Alga calls to mind in its colouring, *Cœnocoleus Smithii* figured in English Botany, t. 2940, but it has not the common sheath of that Alga, and is on a far larger scale. One or two other allied forms or species, occur in East Nepal, to which Dr. Hooker purposes giving, together with the Behar plant, the generic name of *Erythronema*. From the Soane River, also, is an interesting Alga,



belonging to the curious genus *Thwaitesia*, in which the division of the endochrome in the fertile cells into four distinct masses, sometimes entirely free, is beautifully marked. In some cases, indeed, instead of the ordinary spores, the whole mass is broken up into numerous bodies, as in the fertile joints of *Ulothrix*, and probably, as in that case, the resultant corpuscles are endowed with active motion. In Silhet, again, is a magnificent *Zygnema*, allied to *Z. nitidum*, with large oval spores, about  $\frac{1}{8}$  part of an inch long, and a dark golden brown colour, and containing a spiral green endochrome.

Leaving, however, the lower parts of India, the species which occur in Khasia, Sikkim, Eastern Nepal, and the adjoining parts of Tibet, may now be taken. In the hot valleys of the Great Rungeet, at an elevation of about 2000 feet, we have the *Erythronema*, but under a slightly different form; at Nunklow, at about the same height; in Khasia, again, at twice that elevation; in Eastern Nepal, at 12,000; and, finally, at Momay, reaching up to 16,000 feet. In water, highly impregnated with oxide of iron, at 4,000 feet in Sikkim, a *Leptothrix* occurred in great abundance, coloured with the oxide, exactly as is the case with Algæ which grow in iron springs in Europe. At elevations between 5000 and 7000 feet, several European forms occur, consisting of *Ulothrix*, *Zygnema*, *Oscillatoria*, *Lyngbya*, *Sphærozyga*, *Scytonema*, *Conferva*, and *Cladophora*. The species may indeed not be identical with European species, but they are all more or less closely allied to well-known Hydrophytes. One very interesting form, however, either belonging to the genus *Zygnema*, or possibly constituting a distinct genus, occurs in streams at 5000 feet in Sikkim, consisting of highly gelatinous threads of the normal structure of the *Zygnema*, but forming a reticulated mass. The threads adhere to each other laterally, containing only a single spiral endochrome, and the articulations are very long. Amongst the threads are mixed those of some species of *Tyndaridea*. There is also a curious *Hormosiphon*, at a height of 7000 feet, forming anastomising gelatinous masses. A fine new species of *Lyngbya* extends up as high as 11,000 feet. At 13,000 feet occurs either some simple *Conferva* or *Zygnema*, it is doubtful which from the condition of the specimens, and at the same elevation, in the nearly dry bed of the stream which flows from the larger lake at Momay, amongst flat cakes, consisting of felspathic silt from the glaciers above, and the debris of Algæ, and abounding in Diatomaceæ, some threads of a *Zygnema*. At 17,000 feet, an *Oscillatoria*, attached or adherent to *Zannichellia*; and, finally, on the bare ground, at 18,000 feet, on the Dankia mountains, an ob-

scure species of *Cænocoleus*. On the surface of the glaciers at Kinchinjow, on silt, there is a curious *Palmella*, apparently quite distinct from any European form.

Amongst the greater part of the Algæ, from 4000 feet to 18,000 feet, various Diatomaceæ occur, which will be best noticed in a tabular form, as follows; the specific name within brackets, merely indicating the species to which they bear most resemblance.

Himantidium (Soleirolii) .....	4000 to 7000 feet.	Sikkim
Odontidium (hiemale, forma minor) .....	5000 to 7000 "	" "
Epithemia, n. sp. ....	7000 "	" "
Cymbella .....	—	" "
Navicula, n. sp. ....	—	" "
Tabularia (floculosa) .....	6000 to 7000 "	" "
Odontidium (hiemale) .....	11,000 "	" "
Himantidium .....	16,000 "	Momay
Odontidium (turgidulum) .....	17,000 "	" Tibet.
Epithemia (ocellata) .....	—	" "
Fragillaria .....	18,000 "	Momay.
Odontidium (turgidulum) .....	—	" "
Dictyocha (gracilis) .....	—	" "
Odontidium (hiemale) .....	—	Kinchinhow

In those portions of Tibet and the neighbouring regions, explored by Dr. Thomson and Captain Strachey, the principal feature in the Algology is the great prevalence of species of *Zygnema* and *Tyndaridea*, which occur under a variety of forms, sometimes with very thick gelatinous coats. In not a simple instance however, is there the slightest tendency to produce fructification. *Conferva crispata* again, as mentioned above, occurs in several localities; and in one locality a beautiful unbranched *Conferva*, with torulose articulations. At Iskardo, Dr. Thomson gathered a very gelatinous species of *Draparnaldia*, or more properly, a *Stygeoclonium*, if we may judge from a little conglomeration of cells which appeared amongst the threads. A *Tetraspora* in Piti, an obscure *Tolypothrix*, and one or two *Oscillatoria*, remarkable for their interrupted mode of growth, complete the list of Algæ, with the exception of one, to be mentioned presently; as also of *Diatomaceæ*, and of the species of *Nostoe* and *Hormosiphon*, which occurred in great profusion, and under several forms, sometimes attaining a very large size (several inches across), especially in the districts of Le and Piti, and where the soil or waters were impregnated with saline matters. It is well known that some species of *Nostoe* form an article of food in China, and one was used for that purpose in a late Arctic expedition, as reported by Dr. Sutherland; but it does not seem that any use is made of them in Tibet, though probably all the large species would form tolerable articles of food, and certainly, from their chemical composition, prove very nutritious. One species is mentioned by Dr. Thomson as floating, without any attachment, in the shallow water of the pools scattered over the plains, on the Parang River, separated only by a ridge of mountains from Piti, broad and foliaceous, and scarcely

different from the common *Nostoe*, which occurs in all parts of the globe. A very singular new genus, which the young threads have the characters of *Tyndaridea*, but, after a time, little swellings occur on their sides, in which a distinct endochrome is formed, extending backwards into the parent endochrome, separated from it by a well defined membrane, and producing either by repeated pullulation, a compound mass like that of *Dactylaria* or simply giving rise to a forked thread. In the latter case, however, there is no external swelling, but a lateral endochrome is formed, which, as it grows, makes its way through an aperture, whose sides are regularly inflected. He has given to this curious production the name of *Cladozygia Thomsoni*. The whole of the above Algæ occurred at heights varying from 10,000 to 15,500 feet. As in the Southern Himalayan Algæ, the specimens were infested with many Diatomaceæ, amongst which the most conspicuous were various *Cymbellæ* and *Epithemiæ*. The following is a list of the species observed.

<i>Cymbella (gastroides).</i>	<i>Synedra (arcus).</i>
— ( <i>gracilis</i> ).	— ( <i>tenuis</i> ).
— ( <i>Ehrenbergii</i> ).	— ( <i>qualis</i> ).
and three others	<i>Denticula (obtusula).</i>
<i>Odontidium (hiemale).</i>	<i>Gomphonema (abbreviatum).</i>
— ( <i>mesodon</i> ).	<i>Meridion circulare.</i>
<i>Epithemia n. sp.</i>	

There is very little identity between this list and that before given from the Southern Himalayas, as is the case also with the other Algæ. Till the species, however, have been more completely studied, a very accurate comparison cannot be made. In both instances the species which grow in hot springs have been reserved in order to make their comparison more easy. I shall, he says, begin in an inverse order, with those of the springs of Pugha in Tibet, which attain a temperature of 174°. Two *Conserve* only occur in the specimens which have been preserved, viz., an *Oscillatoria* allied to that which he has called *O. interrupta*, and a true *Conserve* extremely delicate with very long articulations, singularly swollen at the commissures. The Diatomaceæ are.

<i>Odontidium (hiemale).</i>	<i>Denticula (obtusula).</i>
— ( <i>mesodon</i> ).	<i>Navicula.</i>
— n. sp. same as	<i>Cymbella</i> , three species.
Pition <i>Conserve</i> .	<i>Epithemia.</i>

Scarcely any one of these except the *Navicula* is peculiar to the locality. A fragment apparently of some *Closterium*, the only one which he met with in the collection, accompanies one of the specimens. The hot springs of Momay, (temp. 176°) at 16,000 feet, produce a golden brown *Cænocolens* representing a small form of *C. cirrhosus*, and a very delicate *Sphærozyga*, an *Anabaina* and *Tolypothrix* and at 17,000 feet, a delicate green *Conserve*; with long even articulations. With the latter is an *Odontidium*

allied to or identical with *O. turgidulum*, and with the former a fine species of *Epithemia* resembling in form, but not in marking, *E. Faba*, *E. (Zebra)* a fine *Navicula*, perhaps the same with *N. major* and *Fragilaria (virescens)*. In mud from one of the Momay springs (a), he detected *Epithemia (Broomelii n. s.)*, and two small *Naviculæ* and in the spring (c) two species of *Epithemia* somewhat like *E. Faba*, but different from that mentioned above.

The hot springs of Soorujkoond, of the vegetation of which very numerous specimens have been preserved, are extremely poor in species. In the springs themselves and on their banks, at temperatures varying from 80° to 158°, at which point vegetation entirely ceases, a minute *Leptothrix* abounds everywhere, varying a little in the regularity of the threads in different specimens, but scarcely presenting two species. Between 84° and 112° there is an imperfect *Zygnema* with very long articulations, and where the green scum passes into brown, there is sometimes an *Oscillatoria*, or a very minute stellate *Seytonema*, probably in an imperfect state. *Epithemia ocellata* also contributes often to produce the tint. An *Anabaina* occurs at a temperature of 125°, but the same species was found also in the stream from the springs where the water had become cold, as was also the case with the *Zygnema*. Mr. Thomas Brightwell finds in a portion of the same specimen *Epithemia alpestris*.

The Diatomaceæ consisted of—

<i>Epithemia Broomelii</i> , n. s.	<i>Epithemia inæqualis</i> , n. sp.
— thermalis. n. sp.	<i>Navicula Beharensis</i> . n. sp.

The vegetation in the three sets of springs was very different. As regards the *Conserve*, taking the words in its older sense, the species in the three are quite different, and even in respect of genera there is little identity, but amongst the *Diatomaceæ* there is no striking difference, except in those of the Behar springs where three out of the four did not occur elsewhere. In the Pugha and Momay springs, the species were either identical with, or nearly allied to, those found in neighbouring localities, where the water did not exceed the ordinary temperature. A longer examination will doubtless detect more numerous forms, but those which appear on a first examination are sure to give a pretty correct general notion of the vegetation. The species, he adds, are certainly less numerous than he had expected, or than might be supposed from the vegetation of those European hot springs which have been most investigated.—*Hooker, Him. Jour. Vol II. page. 381.*

(80) ALLIGATOR. Dean French in his study of words (page 125) says "when the alligator, this ugly crocodile of the new world, was first seen by the Spanish discoverers, they called it, with a true insight into its species, "el



## ALOE FAMILY.

lagarto," or the lizard; as being the largest of the lizard species to which it belonged.

(81) ALLOYS. The natives of India are acquainted with a variety of alloys for making utensils and even ornaments, as with copper and zinc, tin and lead, besides being great workers in copper and brass for the various utensils employed for domestic purposes, and of which so large a variety was sent from different parts of India.—*Royle Arts &c. of India*, page 471.

The following is a memorandum of Drs. Wight and Porteous on the subject of alloys of copper in use in the district of Coimbatore.

The metals employed in the formation of these alloys are copper—zinc—tin—and lead in the following proportions.

1. Copper 10 parts Zinc  $6\frac{1}{2}$ . Alloy valued at 4 annas per seer of 24 tolas weight and is used for all purposes.

2. Copper 10 parts zinc 5—Alloy valued at  $3\frac{1}{2}$  annas per seer, somewhat darker than the other, but considered equally useful.

3. Copper 10—zinc 10—Alloy valued at 3 annas the seer considered inferior to the others, but is also in current use.

4. Copper 10—tin  $2\frac{1}{2}$ —A beautiful bell metal alloy, valued at 6 annas the seer. Is used for the same purposes as the others.

5. Copper 10—tin 2—lead  $\frac{1}{2}$ —An inferior looking alloy to the former but is employed for similar purposes, price not mentioned.

These metals are all imported and are procurable at the following prices in the bazar, copper per seer 5 annas—zinc 1 anna 4 pic—tin 4 annas—lead 1 anna 4 pic.

A vessel of No. 4 was by far the finest of the series, and when gently struck gave out a fine bell sound.

A small piece of this alloy was prepared in their presence. This sample whether owing to some imperfection of the preparation or to the smallness of the mass (5 Rupees weight) did not seem equal to the vessel exhibited, and was found so hard as to be exceedingly difficult to work.—*M. O. C.*

(82) ALOE FAMILY. LILIACEOUS PLANTS.—*Agave Americana*, Common American Aloe, *Outtalay*, *Bramarachsee* Nar or *Kitha Nara*.—Some very fine specimens of this fibre were exhibited at the Madras Exhibition of 1855 by the Tanjore, Travancore, and Nellore local committees, also by Dr. Riddell from Bolarum: Mr. Underwood, Madras: Major Dobbs, Chittledroog: the Lunatic Asylum, Bangalore: Mr. Thorpe, Monegar Choultry, Madras: Assist. Surgeon H. Nott, Tranquebar: Capt. Meadows Taylor, Nizam's Territories: and the Madras School of Arts. In addition to these, there were indifferent and bad specimens of the same fibre, from almost every part of the Madras Presidency. Although this plant is not inde-

## ALOOBOA.

genous, it seems to be one of the most widely diffused in Southern India. It seems particularly well suited for cordage, and from the repeated trials which have been made with it (see "Fibrous plants of India" by J. Forbes Royle, M. D. F. R. S. 1855; Reports of experiments made in the Arsenal Fort St. George, and the Madras Journal of Arts) there is no doubt that when carefully prepared, the fibre is as strong as Russian hemp. The Aloe fibre now forms an article of export from the Western Coast; in the year 1853-54, 3,658 cwts. were exported, valued at Rs. 21,506. It was employed for several years, instead of English hemp, in the Arsenal at Madras, but it was ascertained that the fibre was liable to rot, when frequently wet, and its use was discontinued on this account. It has also been tried in the Madras Arsenal as a substitute for tow in packing shot, but is found to be more easily cut.

Further experiments, however, would probably point out some means of overcoming this defect. The Jury were indebted to Mr. Thorpe for pointing out the cause of one defect, viz. its tendency to rot, and to Mr. Underwood for suggesting a means of obviating it (See process of cleaning the fibres of Agave).—*M. E. J. R. of 1855*.

This Fibre is capable of being turned to great account and several very fair samples were exhibited at the Madras Exhibition of 1857.

The cleanest and best prepared were those of Hurry Row, No. 4,621, and No. 2,977, from J. B. Roupell, Esq., these were soft, pliant and of good strength. E. Ahobalarow exhibited a fair specimen. Kanagaroyen, Native Surgeon at Coimbatore, exhibited Aloe Fibres, dyed of good colors. These are interesting specimens, and though not coming under this section of the Jury, the Committee could not but remark some very serviceable door-mats manufactured in patterns from these colored fibres. Good clean Fibre of Aloe was exhibited by W. Elliot, Esq. of Cuddapah. On the whole the Fibre of the Agave shewed well and both Hurry Row and Ahobalarow were deemed entitled to prizes.—*M. E. J. R. of 1857*.

(83) ALOE PERFOLIATA. Vera, Linn.

Kaithaulai or Kuttalay, TAM.  
Kalabuntha, TEL.  
Koomarie, SANS.

The pulp is eaten by the natives, after having been carefully and repeatedly washed in cold water: they generally mix it with a little sugar and reckon it cooling. It is obtained from the leaf of the small Aloe—*Ainslie's Mat. Med. p. 260*.

(84) ALOOBOA. A rather soft, coarse, open-grained, but not very light Ceylon wood.

(85) ALUM.

Alum, ENG.  
Phitkarie, HIND.

## ALTHEA ROSEA.

*Alum* comes to Ajmere from Sind, where it is made; about three hundred camel loads annually arrive: red alum is brought to Ajmere from Lahore and used in medicine as an astringent; but chiefly employed in dyeing: one maund sells for ten Rupees.—*Genl. Med. Top.* p. 149.

(86) *ALPINIA ALHUGAS*: Ceylon *Alpinia*. Hind. Sans. Taruka, Tara. Found in the marshy parts of the black soil of the Kotah jungle.—*Genl. Med. Top.* p. 171.

(87) *ALPINIA NUTANS*. Nodding-flowered *Alpinia*. Pooag Chumpa. Beng. Cultivated in gardens: was brought by Dr. Irvine himself from Tark to Ajmeer: the flowers are beautiful, and the whole plant is fragrant like the cardamom: the seeds do not ripen.—*Genl. Med. Top.* p. 171.

(88) *ALSOPHILA GIGANTEA*, Wall. *Tree-Fern*. This *Alsophila* occurs at Dorjeling immediately below 6,500 feet the tree-fern appears. It is a widely-distributed plant, common to the Himalaya, from Nepal eastward to the Malayan peninsula, Java, and Ceylon.

*Alsophila gigantea* ascends nearly to 7000 feet in the outer Himalayas.—*Hooker, Vol. I.* p. 110 and 142.

(89) *ALSOPHILA SPINULOSA* is the "Pugjik" of the Lepchas, who eat the soft watery pith: this tree fern grows in Sikkim, abundant, in East Bengal and the Peninsula of India. The *Alsophila gigantea*, another Sikkim tree-fern is far more common than *A. spinulosa* from the level of the plains to 6,500 ft. elevation, and is found as far south as Java.—*Hooker Him. Jour. Vol. II.* p. 13.

## (90) ALSTONIA SCHOLARIS.

Satween or Sheitan, Hind.

*Alstonia scholaris* appears to be abundant in the Concan: and Dr. Gibson of Bombay has found it useful as a febrifuge, he published an account of its qualities about two years ago in the *Pharmaceutical Journal*; he gave it in tincture.—*Ind. Ann. Med. Sci. for April, 1856* p. 397.

(91) *AMBALAM*. (Hort Mal) *Spondias Myrobalan*, Sir William Jones—*Amrataca*, Sans.

*Ambalam* is the Malayalam name of a tree which, Rheede informs us is a variety of the *Ort Ambalam* (*Spondias Mangifera*) or *Caat Maampullum* (Wild Mango) of the Tamools. The fruit when fully ripe is of a pale yellow color of a pleasant flavour, but a little too acid. Sir William Jones tells us, that, in upper Hindoostan, it is used in cookery. See *Asiatic Researches*, Vol. IV. p. 284.—*Ainslie.* p. 221

(92) *ALTHEA ROSEA*, the parent of the many beautiful varieties of hollyhock, a native of China, yields a blue coloring matter equal to

## ALKALINE MINERALS.

(93) *ALKALINE AND EARTHY MINERALS*. Southern India is particularly rich in this class of mineral products, the origin of which seems to be the decaying granites of the country. The most common form of Alkali, is the Dhobee's Earth, a whitish grey, sandy efflorescence, which often covers miles of country where decayed white granite forms the surface soil; the earth contains from 13 to 25 per cent of crude carbonate of soda and begins to accumulate in the dry weather; immediately after the rains, it can be scraped off the surface to the depth of two or three inches, and by repeated boiling and the addition of a little quick lime, the alkali is obtained of considerable strength. With a little care very clean Carbonate of Soda can be obtained, fit for the manufacture of Toilet soap, white glass, and glazes for pottery. The crude earth in different states was exhibited at the Madras Exhibition of 1857, from almost every district. The best samples of the prepared earth were exhibited by Bauloo Moodelly, who has frequently furnished it in large quantities for manufacturing purposes. The Nellore, Cuddapah, Masulipatam and Chingleput Districts, yield this earth in great quantities, and repeated attempts have been made to prepare from it Barilla for exportation, and very fair specimens have been exported at different times, but the moderate price of the Carbonate of Soda of England, prepared from sea salt will always prevent this from being a remunerative article of export. The colored frits for Bangle glass, exhibited in another Class, have lately however become an article of export from the Madras presidency.

*Nitrate of Soda*.—Samples of this salt were exhibited from Bellary and Hyderabad where, it seems to form a natural efflorescence. Its chief use is as a substitute for saltpetre for the manufacture of Nitric and other acids and chemical substances. It is too deliquescent for making gunpowder, though it answers well for some descriptions of fireworks.

*Muriate of Soda*, mineral salt, of very fair quality was exhibited from Bangalore, Bellary and Hyderabad, and is known to occur also in the Guntoor and Nellore Districts and to be almost invariably accompanied by some interesting minerals; viz. gypsum, magnesian limestone, sandstone, sulphur, red and brown iron ores, and alum slate. As most of these minerals have come in from the districts that produce the mineral salt, it would be worth while to direct further search to be made in the vicinity for the sulphur and alum slate, both of which are valuable products. Sulphur is exhibited from several districts associated with the above and other combinations. Alum slate was also exhibited from the Cuddapah District, Vellore, and the Neilgherries, but the accompanying minerals had



## ALKALINE MINERALS.

ing description of the Salt Range in the Punjab, from the Eastern base of the Suliman Mountains to the River Jhelum in the Punjab, Lat  $32^{\circ} 30' - 33^{\circ} 20'$ , by Dr. Jameson, will show the importance of this class of formations.

The rocks in this part of the range are, (1) Magnesian Limestone, (2) New Red Sandstone, (3) fossiliferous sandstone, (4) Red Clay and sandstone containing Coal and Mineral Sulphur, Rock Salt, Gypsum, brown and red Iron ore and Alum slate. The lower beds contain no organic remains but the upper abound in them. The Iron ore is a red or brown Hæmatite, so rich that in many places the needle of the compass becomes quite useless even at a considerable distance from the rocks, owing to their being highly magnetic, from the quantity of iron which they contain. The sandstone abounds with the exuvie of enormous animals, either Saurians or Sauroid fishes.

The Hills at Kala Bagh contain great quantities of Aluminous slate, from which Alum is obtained at various manufactories in that town. The slate, well sprinkled with water, is laid in alternate strata with wood, until the pile reaches a height of 25 to 30 feet; it is then lighted and the combustion continued for about twelve hours, in which time the color of the slate is converted from greyish black to dark red. This change of color indicating that the process has been carried to a sufficient extent, the mass is thrown into a tank holding as much water as it is computed the Alum is competent to saturate. After three days the water, which becomes of a dark red color, is drawn off, mixed with a due proportion of potash and boiled down. The residuum on cooling becoming a solid mass of Alum.

A very interesting series of salts, consisting chiefly of the Muriate and carbonate of soda from the Loonar Lake in the Hyderabad territories, was exhibited in 1857, by Dr. George Smith, Residency Surgeon, Hyderabad. These have already been carefully examined by Professor Mayer and reported upon at some length in Vol. 1, New series of the Madras Journal of Literature and Science. The following is a condensed epitome of the Report and of the chemical composition of the salts.

No. 1. Dulla. This is a Carbonate of Soda with a faint trace of Muriate of Soda and about 2 per cent of impurities.

No. 2. Nimmuck Dulla. Is nearly pure Muriate of Soda.

No. 3. Khuppul. Is carbonate of Soda, with water and about 2 per cent of impurities.

No. 4. Puppre. Is nearly pure Carbonate of Soda.

No. 5. Madkhar. This is an impure salt containing Carbonate of Soda,..... 27

Clay and sand,..... 30

Water about,..... 17

Common Salt..... 25

## AMARANTUS.

No. 6. Bhooskee.

This is also a crude impure substance containing neutral Carb. of Soda... 26  
Insoluble matter chiefly sand and Clay, 58  
Water, ... 15  
Common Salt, ... 2

No. 7. Travertin.

This contains Carb. of Lime, ... 78  
Carbonate of Magnesia ...  
Insoluble matter with Oxide of Iron &c. 9  
Chloride of Sodium, ... 2  
Water, ... 3

The Natron lake of Loonar occurs in the Circar of Meinker, Soubah of Berar, about 45 miles N. W. of Hingolie, in Lat.  $20^{\circ}$  N. It is about 510 feet below the level of the surrounding ground, in a kind of Crater of 5 miles in circumference; the lake being about 3 miles in circumference and surrounded by luxuriant vegetation; springs of clear soft water occur close to the lake, which has evidently been extending its bounds lately, as numerous dead trees are standing within its margin, and a bowrie of sweet water, protected by a wall, is now completely surrounded by the water of the lake. An intolerable stench of sulphuretted hydrogen is emitted by the lake during the heat of the day, and its waters prove destructive to animal and vegetable life, though flocks of duck and teal dot the surface of its waters. There are two saline springs near the centre of the Lake, and about  $\frac{1}{2}$  a mile apart. These never become dry. It is supposed that the muriate of Soda from this source, coming in contact with the Carbonate of Lime which abounds in the vicinity causes the deposition of the Carbonate of Soda or Natron Salt in a greater or less state of purity. The depth of the lake near the salt springs varies from 6 feet during the hot months to 12 or 14 feet during the rains. The salt is raised by divers, who bring it up in their hands. It is much prized and finds a ready sale in both Berars, Nagpore, Candeish, and Poonah, to which places it is carried in Bamboo baskets and retailed by dealers. The Lake has not been regularly worked since 1836, in which year 2,136 candies of the different salts were raised, valued at Rs. 60,081. In 1853 Major Johnston raised 35 candies, valued at Rs. 1,461-4-0.—M. E. J. R. of 1857.

## (94) AMARANTUS.

Nuteya, HIND.

The herb and leaves of several species of Amaranthus are used in Indian Medicine under the term Nuteya.—O'Shaughnessy.

In the Cyclopædia of India, it was mentioned that Dr. Wight had given in his Icones the considerable number of eleven species of this genus, but Voigt's Catalogue of plants enumerates twenty-six species and varieties as having

## AMUCK.

been grown in Bengal, viz. *Amarantus tenuifolius*; *polygonoides*; *polygamus*, *Blitum*, *tristis*, *campestris*, *polystachyus*, *viridis*, *lividus*, *oleraceus*, *viridis*, *ruber*, *albus*, *gigantens*, *gangeticus*, *lanceolatus*, *atropurpureus*, *tricolor*, *Melancholicus*, *fasciatus*, *hybridus*, *frumetaceus*, *retroflexus*, *candatus*, *paniculatus*, *hypochondriacus* and *spinosus*.

### (95) AMARANTHUS CAMPESTRIS. Lin.

Sirroo keeray, TAM.	Maykanada, also
Choorie key banjee, DUK.	Gunna SANS.
Tseerikoor, TEL.	

*Ains. Mat. Med. p. 257.*

(96) AMARANTUS POLYSTACHYUS, COOPPAY KEERAY, Tam. This is the *Amarantus polystachyus*. Lin.—*Ainslie*, p. 253.

### (97) AMARYLLIS AUREA. GOLDEN AMARYLLIS.

Zurd-sosan, HIND.

Cultivated in Ajmere gardens and very ornamental. Voigt gives the following species of *Amaryllis*, viz. *Belladonna*, *pallida*, *blanda*, *Josephine*, *substriata*, *Griffithiana* and *grandiflora*.—*Gen. Med. Top. p. 188.*

(98) AMBALAM, according to Edye, is the Malayala name of a wood which produces a fruit considered by the natives to be the wild Mangoe. The fruit is very acid, and as well as the wood, is of no use.—*Edye, M. & C.*

(99) AMBER, The lumps of amber forming the necklaces of women in Sikkim (called 'Poshea') are procured in East Tibet, probably from Burmah.—*Hooker Him. Jour. Vol. II. page 194.*

### (100) AMBERGRIS.

Ambergris, ENG. | Suhabiri, MALAY.

(101) AMBOYNA. The Massacre, here, occurred in 1623.

### (102) AMETHYST.

Soognndee Kulloo, TAM.	Manik, HIND.
Murtees, ARAB.	Scuandi, CYNG.

Some of these beautiful lilac coloured minerals are found in Ceylon, in the bed of the Godavery, but occur also in the West Indies, and in Bohemia.—*Ainslie.*

(103) AMOMUM. Of this genus, Voigt enumerates nine species as having been grown in the vicinity of Calcutta; viz. *cardamomum*, *angustifolium*, *aculeatum*, *maximum*, *dealbatum*, *subulatum*, *aromaticum*, *sericeum*, and *cornostachyum*.

### (104) AMOMUM CARDAMOMUM. Lin. CARDAMOM.

Yaylersie, TAM.	Yaylakooloo, TEL.
Eelachie, DUK AND HIND.	Kapalaga, MALAY.

*Ainslie's Mat. Med. p. 270.*

(105) AMUCK, MALAY; a furious reckless onset, the muck or the "run a muck" of the English.

## ANCIENT INDIA.

### (106) AMYGDALUS COMMUNIS.

*The Oil.*

Almond oil, ENG.	Badam ka tel, HIND.
Bathama nuna, TEL.	Batham yeunai, TAM.

(107) AMYRIS ACUMINATA, ACUMINATED AMYRIS AND AMYRIS NANA DWARF AMYRIS, are both abundant with several other species in the Ajmeer hills.—*Genl. Med. Top. p. 190.*

### (108) AMYRIS COMMIPHORA.

Meisakshi, HIND.	Mygashee, TAM.
Mahesakshi, TEL.	Googul, HIND.

Dr. Irvine tells us that this is a very abundant tree and shrub in the Ajmeer hills; the tree yields a gum called googul gond, used as incense and in medicine; the gum is very like myrrh; the wood is useless except to burn, and the smoke is so pungent as to make it disagreeable to use in that way.—*Gen. Med. Top. p. 190.*

### (109) ANACARDIUM OCCIDENTALE.

*The nut.*

Moondrie cottay, TAM.	Moontamamedei ghenzaloo, DUK.
Cajooke ghootlie, TEL.	Cashewnut, ENG.
Beejara Sula, SANS.	

These nuts grow at the end of the Cashoo apples, and when roasted, are very palatable and wholesome, but more so when boiled in milk. The oil between the two shells is good for marking linen. It also makes a fine black varnish, oil very caustic.

Rheede, in his "Hortus Malabaricus" tells us, that the nuts slightly toasted are supposed to excite venery, strengthen the stomach, and afford relief in cases of vomiting and nausea.—*Ainslie, p. 228.*

*The oil.*

Caju apple oil, ENG.	Moonthamanedy nuna, TEL.
Cajoo ka tel, HIND.	Moonthericotta yeunai, TAM.

(110) ANAMITE, the name of the monosyllabic language of the Cochin Chinese.

(111) ANCIENT BUILDINGS AND RACES OF INDIA.—The preservation and illustration of ancient monuments, so essential to the early history of all countries, is more particularly important in India, where, owing to peculiar causes, no connected historical relations anterior to the 12th century are in existence. It becomes, therefore, so much the more an object of importance to supply the void as far as possible from the contemporary remains of earlier periods, which now constitute almost the only records of such times. I doubt, however, says Mr. Elliot, whether the plan, of which the outlines are sketched in the Governor General's minute, is calculated to yield useful results. Large edifices and important works of the earlier ages of civilization are comparatively rare in Southern India, and none are so congregated in one neighbourhood to allow of particular places being indicated as objects of primary research.



The subjects on which light may be expected to be thrown by antiquarian research are those connected with early history, and the ascendancy of different races, the introduction and influence of religious creeds, the increase and decrease of the population, the advance of trade, manufactures and other points of statistical interest, the progress of arts, science and literature and their condition at different periods.

The two first, viz. the course of historical and religious events, are intimately connected. Some of the greatest revolutions in the social and political relations of India have been occasioned by changes of religion. It is to the implacable rancour of the sectarian zeal generated at such times that the destruction of historical data is chiefly attributable. The earliest political change to which we can go back in the history of the Peninsula is the expedition of Rama into the forests of Dandacaranya, an event coeval with the hero worship of the Pandavas, and the Myths of the Bharata and Ramayanam. The Braminical crusade of which he was the leader, scattered the aboriginal races (the Rakshasas and demons) driving some into the mountainous and forest retreats where we still find them living in barbarous freedom, and reducing others to the state of agrarian slavery in which we now see the Pariahs, Pallars, Chermars, and other degraded castes existing in the plains. Each province has its peculiar race of Helots. Each range of mountains and every tract of forests its own tribes of wild savages either wholly independent, or partially subject to their more civilized neighbours in the open country. From the Paharis (undoubtedly a remnant of the great Tamulian or Southern family) of the Rajmahal Hills on the banks of the Ganges, through the extensive regions of Gondwana, embracing the Khonds, Sourahs and Chenchers of the Eastern Ghats, the Yanadies, Iralars, Curumbars, (at one period apparently the most numerous and powerful race of all,) in the midland provinces,—to the Bedars, Maravars, Kallars and other tribes, too numerous to particularize, comprised under the general term of Malayalis, or mountaineers in the south, we find an infinite succession of races professing customs and speaking languages differing, and, in many instances, distinct, from those of the modern Hindus. The same peculiarities may be observed in several of the nomade castes roving over the plains in the more civilized portions of the country, such as the Korchewars, Wodde-wars, Yerkelwars or Pardis, &c. A careful and systematic investigation of these remains of the former population, of their customs and religious observances, &c. with the preparation of copious vocabularies of the peculiar dialects or jargons in use amongst them, are among the most important objects to which attention should be directed. The study of these outcaste tribes, of their lan-

guage, manners and customs form nearly the only available source from which we can glean a knowledge of the aboriginal inhabitants of the Peninsula.

The complete extirpation of Buddhism as the national creed, of India, constitutes another interesting subject of enquiry. We know that it was once the predominant religion when the whole of India was subject to the sway of a single sceptre, and that even after the subversion of that power, it continued, for several centuries posterior to the christian era, to be professed by a large portion of the population. A terrible persecution swept it away with all its reminiscences, so that hardly its name survives in the south, or if pronounced at all, it is uttered with fear and a shudder of aversion at the very allusion to such impiety. But, although so completely eradicated, vestiges of it are still apparent. The temples of the old faith have been consecrated to the service of the new, and the ill concealed attempts to obliterate the distinctive marks of their original dedication can still be detected. The dates and periods of many of the chief festivals, nay the very sites and objects of adoration—not excepting the celebrated fane of Jagannath itself,—have simply been transferred from the one denomination to the other. It is to the civilised and polished spirit of Buddhism that are due the suppression of living sacrifices, including the cow (and probably that of human victims, at one time apparently universal and still in use among the most barbarous races), the exchange of a vegetable for an animal diet, and other equally marked observances. The Buddhists were in fact the reformers of their age, and to their genius is due all that is great in art or science and much that is still more valuable in literature. Surely, then, a more thorough examination of their extant monuments would well repay the labor and expence of the search. Again it was the establishment of the Lingayet or Jangama sect which overthrew the powerful dynasty of the Calyan Chalukyas in the Dekhan, and the rise of the three great existing schools of Braminical philosophy (the Dwaitya, Adwaitya and Vasistadwaitya) were in like manner connected with remarkable innovations in religious belief and with changes of political ascendancy, vaguely transmitted by tradition but of which no definite written records are forthcoming, leaving a void which we can only hope to fill by the gleanings of antiquarian investigation.

The condition of the population and national resources has fluctuated not less remarkably. Whole tracts of country once thickly peopled have been abandoned to the jungle. Some of the most unhealthy spots, where malaria now reigns undisputed, and where forests, apparently the growth of centuries, have long flourished undisturbed, exhibit in the mounds of villages

tanks, pagodas, the ridges of obsolete paddy fields, the remains of crumbling temples and sculptured stones, traces of a numerous and civilized population. With these are interspersed curious tombs, cairns and sepulchral circles which have no affinity or relation to the corresponding practices of the modern inhabitants.

Another object of attention is found in remarkable institutions, distinguishing particular districts, some of which, such as tenures of land, the functions of hereditary offices, local weights, measures, accounts and other peculiar usages are in course of being swept away by the progress of modern improvement. Every province, nay often every village, has its own special customs, which must soon disappear before the generalizing influence of foreign rule, the growth of new judicial and revenue institutions, the levelling operation of the Adalat Courts and assimilating influence of revenue surveys and new systems of police. Although the exigencies of the State have caused more attention to be paid to such subjects than to most others, the nature of the investigations have partaken too exclusively of a merely utilitarian character. Many ancient forms have already been wholly displaced, though many more remain, presenting points of interest to an antiquarian eye which the mere fiscal observer passes unheeded.

The vestiges of early art are still numerous. Those connected with architecture, sculpture and painting, called into being by the exigencies of religion, always the best stimulus to works of design, have suffered more from sectarian zeal than the ravages of time, but they are widely scattered over the length and breadth of the land. Sculptured stones, fortifications, temples, works of irrigation, are found in every direction, and not only impart a knowledge of the state of science and civilization at various periods, but throw a valuable light on the other subjects of inquiry already noticed. Images of deities no longer worshipped, monumental effigies illustrative of actions and practices long forgotten, the very name and intention of which have faded from remembrance, furnish cumulative evidence of radical changes in the social system occasioned by the sweeping revolutions before alluded to. Within a short morning ride of Madras a sculptured image of Buddha may be seen lying neglected in a small village not far from the Poona-mallée road. Monumental stones commemorative of *Suttees* and the death of warriors, are also met with in the immediate neighbourhood of Madras exhibiting peculiarities of costume, ornaments, arms and implements of great interest and wholly distinct from those now in use.

The places then to which attention should first be directed as most likely to yield prominent monuments are the capitals of the earliest known Hindu dynasties. These are

### I. In the Northern Circars.

1. Chicacole and Rajahmundry, the capitals of Andhra and of a race of sovereigns anterior to the Christian æra; a more exact knowledge of these and of the early Buddhist princes of Vegi or Vegi Desam who reigned at Dara Nagara on the Kistna near Amaravati and at Vengipuram the exact site of which is not yet known, is an important desideratum only likely to be obtained from an investigation of their monumental and architectural remains.

2. The capitals of the Calinga Chalukya power at Rajahmundry, and throughout the Northern Circars. Extant sasanas and sculptured remains exhibit several alternations of superiority between them and the Gajapatis of Orissa.

3. That of the Ganapati or Kakateya dynasty at Warangul, which, though near the frontier, and properly in the Nizam's territory, was the capital of great part of the N. Circars.

4. Of the Reddies of Condavir.

N. B.—The succession of the Buddhist race by the Chalukyas of Rajahmundry, the subsequent sway of the Ganapatis, Vema Reddies and Rayels of Bijanagar, together with their contests and the various relations between them, are little known and may be amply elucidated by existing remains.

### II. In the Ceded Districts.

These formed part originally of the kingdom of the Cholas with whom they were occasionally disputed by the Calyan Chalukyas and ultimately they constituted the principal portion of the kingdom of Bijanagar or Anegundi. The capitals of the latter power were successively Bijanagar on the Tungabhadra, Penaconda and Chandragiri. The ruins of Bijanagar and Chandragiri are extensive and remarkable.

### III. In the Southern Districts.

1. An ancient aboriginal people called Curumbers are the earliest known occupants of Dravida Desam, the modern Carnatic and Coromandel. They seem to have established numerous petty principalities over the whole Peninsula, which were ultimately absorbed in the Chola empire. Numerous sites attributed to this race and still called Curumber Cotes, are to be met with. The number, site and condition of these with any remains still extant, should be carefully ascertained and noted. Small communities of the same tribe are found to this day in the less accessible hills and forests of many parts of the peninsula.

#### 2. The Cholas.

The several capitals of the Cholas were at Conjevean, Wori-ur, Combaconum, Gaugondaram, Tanjore. The whole history of this, the most important power in the Peninsula, is involved in great obscurity. We have no authentic information that can be trusted, anterior to the 9th century, yet they must have been exercising



sovereignty in the time of Ptolemy, who makes mention of "Arcati soren," and in the Mahawanso frequent references to transactions with the Cholas occur during the earliest periods of the Singhalese annals. The Tamil traditions abound with stories of Adondra Chakravarti, who appears to have been the subduer of the aboriginal or Curumber tribes before mentioned, yet no trustworthy records of his origin and actions are forthcoming, neither have authentic accounts of the overthrow and extinction of any of the great Southern States been yet obtained.

3. The Pandyan capitals were at Kurkhi, Kalyanapura, Kulasekara pattanam and Madura. The site of Kurkhi or Horkai is still a matter of dispute. It has been considered to be the Kolkhi of the Peripuls identified by D'Anville with Kilakarai near Ramesseram, and by others with Korkai or Gorkai near the mouth of the Tambraparni.

4. The Chera princes appear to have been established first at Seandapura in the Malabar Coast and subsequently at Talcaul or Dalavanpura on the Caveri and Mudugonda patnam, perhaps the same as the modern village of Mudugondoor on the road from Seringapatam to Koonghul. The locality of Seandapuram remains to be ascertained. Buchanan describes Talcaul as a place of some extent, containing many buildings nearly covered with sand. Beyond this cursory notice, no description of it appears to be extant. It is not even named in Hamilton's Gazetteer. The "*Carura* regio Cerebothri" has been supposed to indicate that Caroor in the Coimbatore country was one of their earliest seats.

The whole of the early history of these three last mentioned dynasties, their wars, alliances, intermarriages and conquests; their relations with Ceylon and with the Mahomedan colonies of Maabir and the Malabar Coast, (the founders of which approaching by sea obtained a footing in South India before the entry of their co-religionists from the North-West,) are involved in the greatest doubt and obscurity, which can only be elucidated by a careful examination of their remaining monuments. The traces of Southern Mahomedan establishments should also be carefully noted.

The Western Coast comprising the ancient kingdom of Kerala, some time subject to the Cheras, likewise offers an interesting field of research. The frequent mention of the principal places by the Greek and Arabian Geographers, the ready access afforded by its ports to maritime enterprise, the colonies of Persians, Arabs, Syrians, Jews, established there from the earliest times, may all receive important elucidation from an examination of existing remains of ancient sites. Although more subject to the operation of external influences than most other parts of India, it is here that the early Hindu institutions

have been best preserved, and that we may look with the best founded expectations of enlarging our knowledge of aboriginal races and primitive customs. The remarkable tribes to be met with in the depths of the forests and mountains of the Syhadri range, the traditions of the polity of Parasurama and of the arrival of some of the present dominant classes, the Haigas, Chitpawans, Namburis, Teers or "Islanders," &c. afford curious sources of inquiry and speculation.

In the addition of the above specified sites of political interest, the great religious institutions and establishments demand attention, such as Sri Sailam in Cuddapah, Canjeveram, Chellambaram, Srirangam &c. There are also many religious edifices of great architectural merit very worthy of being depicted and preserved for the beauty of their sculpture and elegance of their design, such as the stone mantapam in the Fort at Vellore now used as an Arsenal, the temples at Tanjore, Gangondaram and Tribhuwanam, the ruins of Bijanagar, the pagodas at Leepichi in Bellary, Tarpatri in Cuddapah, with many others equally worthy of admiration, in secluded and desert places, little known beyond their immediate neighbourhood, which would doubtless reward the institution of careful enquiries. Short descriptions of all such edifices should be particularized in the reports. It is worthy of remark that nearly all the finest buildings of early times have been constructed of stone, while the edifices of modern times, (that is within the 500 years), comprising some of the most stupendous piles at present to be met with, are of brick.

If the range of inquiry is extended to Hyderabad and Mysore, the list might be greatly extended. The Nizam's territories comprehend the seats of some of the greatest and most powerful sovereignties of the Dekhan. Such as Calyan the capital of the Western Chalukyas, and Bijala rayas; Devagiri or Deoghur the capital of the Yadavas; Warangal that of the Kakateyas; and the great Mahomedan principalities of Calburgah, subsequently split into the subordinate powers of Bijapur (the Adil Shahs) Ahmednagar (Nizam Shahs) of Golconda (Cutub Shahs) Berar (Imad Shahs) and of Beder (Birud Shahs) &c.

In Mysore we find the Bellalas, a Yadava dynasty reigning at Dwarasamudram the modern Halibidu.

The points on which information is more particularly desirable are

1. The existence of Cave Temples.
2. Sites of ruined and deserted cities or places of importance fallen to decay though still inhabited, particularly such as tradition states to have been capitals of former rulers.
3. Stone or other ancient pagodas of magnitude or fine architecture. Many of these are now deserted and in ruins. For examples we may in-

## ANDROPOGON ACICULATUS.

stance the great temples at Tanjore, Gangondram the brick structure at Negapatam supposed to be a Buddhist work &c. The brick remains of the palace of the Cholas near Combaconum.

4. All paleographic remains, such as sasamams and other ancient grants, whether stone or copper. Wherever a considerable number of the former occur in the same place, a hopeful field for investigation may be expected. The copper grants may easily be copied, if sent to the Presidency, and returned to the owners.

5. Sculptured rocks or walls, or stones, whether monumental or commemorative of important persons or events.

6. Ancient walls, fortifications, durgas or hill forts. Such as the wall said to make the boundary between the Chola and Pandya kingdoms in Madura, remains of which have been traced near Ramagiri, the Cuddanags of Coorg &c.

7. Remarkable mounds indicating sites of towns, fortresses, or other buildings, such as the tope at Dipaldinni on the Kistna, the mounds called Curumber Kotes, the Buddha Teppes or heaps of scoria described by Captain Newbold.

8. Fine works of utility or irrigation, such as the Tungabhadra and Caveri anicuts, the Poneri tank in Trichinopoly, the bridges at Sivasamudram and Anagundi, &c.—*Minute of Mr. Walter Elliot*.

(112) ANDROGRAPHIS PANICULATA. (Justicia Roxb).

Kalupnath or Mulla tita,	Kalamegh, HIND.
BENG.	Kreyat root, ENG.

In India the roots of this plant has long been a popular febrifuge and stomachic. It is the basis of the Drogue amere. It is the genuine or original chiretta.—*Ind. An. No. 6*.

(113) ANDROMEDA FASTIGIATA; the Himalayan heather, grows abundantly on Mon Lepcha, at 13,080 feet, and affords a good fuel.—*Hooker, Vol. I. p. 343*.

(114) ANDROPOGON. Species of this genus, to the number of eighteen, are given in Voigt's Catalogue of Calcutta plants, Andropogon arundinaceus, binatus, Baladhii, conjugatus, cymbarius, ~~glober~~, iwarancusa, Martini, mili-forinis, muricatus, nardus, pertusus, prostratus punctatus, Roxburghianus, scandens, Schoenanthus, trispicatus.

(115) ANDROPOGON ACICULATUS, NEEDLE LIKE ANDROPOGON. Spear grass.

Soorwulla, Soorwul, HIND. | Shunkinee, SANS.

In Ajmere abundant in barren land, troublesome to the feet of those who walk among it, eaten by cattle when other grass is not to be had. The common names of this variety are "lampa" and "chora-kanfa." A longer variety known solely as "soorwul" is an excellent grass for cattle.—*Genl. Med. Top. p. 176*.

## ANIME.

(116) ANDROPOGON BICOLOR. Black Joar,

Kala Joar, HIND.

Is cultivated in some places.—*Genl. Med. Top. p. 176*.

(117) ANDROPOGON NARDUS. LEMON GRASS.

Wassanapilloo, TAM.	Gendbel, HIND.
Naringe ke bas ka ghas,	Boostrina, SANS.
DRK.	

The Wassanapilloo makes a very pleasant tasted tea and valuable diet drink.—*Ainslie's Mat. Med. p. 258*.

(118) ANDROPOGON MURICATUS. Sharp-pointed Andropogon. Garrar, Gandar Hind. the plant; khuss-khuss Hind. the root.—*Genl. Med. Top. p. 176*.

(119) ANDROPOGON SERRATUS. Serrate Andropogon. Khura also Khurrar also Jeemoota, Hind. Grows in moist places in the plains, is considered the best grass at Ajmeer to preserve for cattle.—*Genl. Med. Top. p. 167*.

(120) ANEMONE. Speaking of these Mr. Fortune says, that many which he first imported have found their way to the principal gardens in Europe, and when writing in October, 20, 1846, the Anemone japonica was in full bloom in the garden of the Society at Chiswick, as luxuriant and beautiful as it ever grew on the graves of the Chinese, near the ramparts of Shanghai.—*Fortune's Wanderings, page 405*.

(121) ANGELIC TREE.

Angelic marum also Assanpela marum, TAM.

(122) ARTOCARPUS PUBESCENS. Willd. This grows in Travancore, and is commonly used, in that country, for ship building. The bark of the tree is employed, in Canara, in preparing a brownish dye.—*Ains. Mat. Med. p. 209*.

(123) ANCHUSA. Voigt names A. officinalis, paniculata and undulata, as having been grown near Calcutta.

(124) ANIMAL CHARCOAL, or Ivory Black. Carbo animal is; Dr. O'Shaughnessy tells us when pure, is entirely dissipated on talc or platinum, if burned with Nitrate of Ammonia. Should not effervesce on addition of Muriatic Acid, and the filtered liquid should give no precipitate on Ammonia being added.

(125) ANIMAL OILS. The following were exhibited at the Madras Exhibition of 1855.

Oil made of Peacock's fat from Tinnevely.
Neat's foot Oil.....from Masulipatam.
Alligator's fat .....from Do.
Guana Oil, Mr. Bowden from Guntoor.

(126) ANIME. As the mutual resemblance between Anime and Copal renders it often difficult to discriminate them, it may be useful to subjoin the following decisive test of distinction. Copal is nearly insoluble in alcohol; Anime is readily and totally soluble therein. Let a few grains be put in a wine glass with a little



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alcohol: if it be Anime, it will dissolve; if Copal, it will sustain no diminution.—*Comp. Descr.*

### (127) ANONA RETICULATA. Lin.

#### *The Fruit.*

Ramasita pullum, TAM.	Manna, MALAY.
Rasm sita pull, DUK	Bullocks Heart. ENG.
Rama sita pundo, TEL.	Rama sita, SANS.

This soft, sweetish, pulpy fruit, is not much sought after by Europeans who consider it as heavy and unpalatable.—*Ainslie, p. 232.*

### (128) ANONA SQUAMOSA. Lin.

Sita SANS.	Custard apple, ENG.
Sita pullum, TAM.	Seeree cayoo, SUMATRAN.
Sita pull, DUK.	Manna Papuwa, MALAY.
Autacheeka, MAL.	

This fruit is wholesome and nutritious, and being perfectly free from acid may be given to such delicate people, as dare not venture on others of a different nature.—*Ainslie, p. 232.*

### (129) ANTIDESMA ACIDA. Lin.

Poolchie pullum, TAM.

This acid fruit eaten by the common people, grows in the woods.—*Ainslie, p. 321.*

### (130) ANTIDESMA ALEXITERIA. Lin.

#### *The Bark.*

Noelha talie puttay, TAM.

From the nar or tough stringy fibres of this bark, the inhabitants of Travancore make ropes.

#### *The Fruit.*

Noelha Tali pullum, TAM. | Nuli Tali, HORT. MAL.

This is a pleasant tasted, reddish coloured fruit, said to be prized, on the Malabar coast for its cooling qualities.—*Ainslie, p. 183 & 229.*

(131) ANTIMONY. At the Madras Exhibition of 1857, Sulphuret of Antimony or Soorma of good quality was exhibited from Vizianagram. The substances sent as Soorma from Kurnool and Hyderabad were Galena or Sulphuret of Lead, and Dr. Scott intimated that he has frequently tested the Soormas of the Bazar and found that they do not contain Antimony but that they usually consist of Iron ore or Galena.

### (132) ARCHIPELAGO OF INDIA. EASTERN ARCHIPELAGO. INDIAN ARCHIPELAGO.

The following observations are from the pen of Mr. Earl. The contrast which the volcanic Islands of the Archipelago afford when compared with the continent of Australia is very strikingly presented to the view of a voyager from Port Essington, crossing for the first time the sea that separates the continents of Asia and Australia. Even before he has lost soundings on the great bank which extends from the northern shores of the latter continent, the lofty mountains

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the colour of the water suddenly changes from green to deep blue; he has now passed the steep edge of the bank, and is floating on the unfathomable seas which bounds the volcanic Islands of the Archipelago. On closer examination, he finds that the land of Timor rises abruptly from the depths of the ocean, so much so, that from many of the precipices which overhang the sea, a line of great length will not reach the bottom, while the very few spots on which anchorage is to be found are so close to the shore as to be available only when the wind blows from the land. And to complete the contrast, if the weather is clear we perceive that one of the mountains near the east end of Timor is an active volcano. The chain of Islands which extends from Java to Timor is of the same character; lofty volcanic peaks, some in a state of activity; while the Islands are separated from each other by narrow channels of unfathomable depth, through which the current from the Pacific, caused by the prevalence of easterly winds, rushes with great force; but on passing these the voyager again perceives a change in the colour of the sea from deep blue to green, and, on sounding, he finds a bottom of stiff clayey mud, resembling exactly that of the bank which fronts the northern coasts of Australia, he is now on the great bank which extends from the south-eastern extremity of Asia far into the seas of the Indian Archipelago. The Islands now lose their volcanic character, and on arriving at Singapore, near the extremity of the Malay Peninsula, the general resemblance of the country to that in the neighbourhood of Port Essington is sufficient to strike the most careless observer. The land low and undulating; the shore with red cliffs alternating with sandy beaches; even the rocks of the red iron-stone known to Indian geologists by the name of laterite, are perfectly in character with the country of the Coburg Peninsula, and even on closer examination little difference can be discovered except in the vegetation.

These banks of soundings which extend from the continents of Asia and Australia, form very remarkable features in the geography of this part of the world, and, as such, are deserving of more attention than has hitherto been bestowed upon them, since it will be found that all the countries lying upon these banks partake of the character of the continents to which they are attached; while those which are situated on the deep sea which separates them are all of comparatively recent volcanic formation, with the exception of a few small coral Islands, which in all probability, are constructed upon the summits of submerged volcanoes. Mr. Darwin's essay on the "Structure and Distribution of Coral reefs," has satisfactorily shewn that "Atolls"

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constructed around islands that have since subsided. The depth of water on these banks averages about 30 fathoms, depending rapidly as the edge is approached, and shoaling gradually towards the land. The one termed the *Great Asiatic Bank* extends into the Archipelago from the south-eastern extreme of Asia to a distance of nearly 1000 miles, in fact to within 50 miles of Celebes, and we may suspect that it will be found to extend to the south-western extremity of that Island also; but as there is a space of nearly 30 miles across which no soundings have been carried, the plan was preferred of reducing the bank to the limits for which we have actual data.

### *Countries lying on the Great Asiatic Bank.*—

The similarity that exists in the direction of the mountain ranges in the south-eastern part of Asia has often been the subject of remark. These invariably run in a direction nearly N. N. W. and S. S. E., and are all of the primary formation. The chain which extends along the Malay Peninsula is the most conspicuous of these ranges, and is continued at intervals to Banca and Billiton, and perhaps may be traced as far as the north coast of Java. It is this range that most abounds in metals, or, at all events, in which mining operations are pursued with greatest success, probably from the strata, owing to its central position, having been little disturbed by the convulsions which have shaken the countries on either hand. The productiveness of the gold mines of the Malay Peninsula and of the tin mines of Banca is well known. This range may be considered as the back bone of the *Great Asiatic Bank*. Sumatra, which lies on its western verge, has been subjected to volcanic action, but not to so great an extent as to disturb the direction of its mountain range, which runs parallel to that of the Malay Peninsula. The third and last range that can be traced into the Indian Archipelago is the one that traverses Laos and Cambaja, at the southern extremity of which it disappears for a time, showing itself only at Pulo Condor and Natunas, until it emerges near the north-west extreme of Borneo, and is continued along the entire west coast of that island. Here it again disappears, and only shows itself again on the north-coast of Java, where it ceases entirely; the remaining portion of this Island, with perhaps, a part of the north-west extremity, being either of volcanic formation or of alluvial deposit. It is rather singular that the celebrated teak-tree, which abounds on the Cambodian part of this range, but is not found in Borneo, is again met with here, the projecting part of the north side of Java, between Samarang and Surabaya, being a vast teak forest, from the timber of which the greater portion of the shipping employed in the Archipelago is constructed. Java is the only Island in the eastern seas in which

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the teak-tree is indigenous, nor will it thrive in the volcanic parts of the Island where its cultivation has been attempted. This, which we may call the *Cambodian Range*, is also rich in minerals, especially the Bornean part of it, where large quantities of gold and many diamonds are obtained by the miners. The volcanic Islands of the Archipelago also contain metals, gold-dust being found at the bottoms of many of the mountain streams, but it does not exist in veins, as in the Malayan Peninsula and on the west coast of Borneo, these having apparently been broken up by the violent convulsions to which these Islands have been subjected. The metal is therefore only obtained from the bottoms of the mountain streams, where it has been deposited when the earth in which it had been contained was washed away.

### *Volcanic Islands of the Indian Archipelago*—

The lines of volcanic action to which these Islands have been subjected can be traced with tolerable distinctness. One of these extends along the W. coast Sumatra and the S. coast of Java; whence it is continued by a chain of Islands, separated by narrow but deep channels, to New Guinea, and can be traced through that Island to the Louisiade Archipelago, and is probably continued by New Caledonia and Norfolk Island to New Zealand, thus forming a curved line resembling the letter S. The other line commences in Kamtschatka and extends through the Kurile Islands, Japan and Loochoo, to the Philippines, where it separates into two branches, one traversing Palawan and the N. W. part of Borneo, where it terminates near the limits of the *Great Asiatic Bank*, and the other continuing in a southerly direction until it comes in contact with the Sumatran line. It is near this point of contact that the volcanic action has been strongest, throwing the islands into fantastic forms, of which Celebes and Gillolo furnish striking examples. These islands all rise abruptly from an unfathomable sea, a circumstance unfavourable to their productiveness, since a large portion of the rich soil created by the decomposition of the volcanic rock is washed away into the ocean. Java, however, is in a great measure exempt from this disadvantage, owing to the *Great Asiatic Bank* extending to its northern coast, which prevents this soil from being lost, in lieu of which it is deposited in vast plains lying between the mountain range and the sea. These plains are so surpassingly rich that they not only yield a sufficiency of grain for the consumption of a large portion of the population of the Archipelago, but at the same time afford such abundance of sugar and other tropical produce as to furnish cargoes for many thousand tons of shipping.

*The Great Australian Bank.*—The remark



that has been made with regard to the ranges in the south-eastern part of Asia is equally applicable to Australia, since one of the most marked features in the geography of this continent is the uniformity that exists in the direction followed by all the continuous mountain ranges that have yet been discovered. The Darling range on the W. coast of Australia, the great chain that extends along the N. E. coast, with the range that traverses a portion of South Australia, and in which metallic ores have lately been found in such abundance, pursue a direction nearly N. N. W. and S. S. E.; and although the range on the E. coast of New South Wales vary somewhat upon this point, it is still to so slight a degree as not to require any particular remark. That this rule is also applicable to the lesser ranges is proved, at least as far as the shores are concerned, by all the deep inlets on the coasts of Australia preserving the same general direction, that is, running parallel to the mountain ranges; indeed so generally is this the case, that there is scarcely even a deep bay throughout the entire coast that does not conform to the general rule. The same occurs in Van Diemen's Land; indeed this Island must be considered as being a portion of Australia, for, although really insular, being surrounded by water, it is still joined to the continent by a bank of soundings on which there is a depth of from 35 to 40 fathoms.

The great bank which fronts the N. and N. W. coasts of Australia commences near the N. W. Cape, and extends in a N. E. direction to New Guinea, where it terminates at the base of the high but narrow mountain range that unites the eastern and western parts of that Island, and separates the Banda Sea from the Great Pacific. It is at this point that the edge of the bank is most remote from Australia, the distance to the nearest point of the N. coast being 400 miles. It appears again on the S. coast of New Guinea, near Torres Straits, and extends along the N. E. coast of Australia, the Great Barrier Reefs being on its outer edge.

The Arru Islands and New Guinea are thus united to the continent of Australia, and it is rather a singular coincidence that the kangaroo, an animal which was long supposed to be peculiar to Australia, is found both in the Arru Islands and on the southern part of New Guinea; as no specimens have been met with on the northern coasts of the latter Island by Forest and the French navigators who have been there, it seems to exist only on the portion included by the Great Australian Bank.

*New Guinea.*—The northern part of this Island, that is to say, the portion lying to the N. W. of the range of mountains already alluded to, partakes of the rugged and broken character of the volcanic Islands of the Indian Archi-

pelago, but the south-western part is low and undulating, and we may conclude that it bears considerable resemblance to the northern coasts of Australia, since the several Dutch navigators who explored the Gulf of Carpentaria, and who are in the habit of coasting this part of New Guinea on their way to Australia, considered them as being portions of the same continent, and they were thus delineated in our maps until Cook passed through Torres Strait and decided the question as to their insularity. A very interesting account of the S. W. coast of New Guinea, is given in Modera's "Narrative of the voyage of the Dutch Corvette 'Triton' in the year 1828," when this coast was explored with a view to forming a settlement: and contains information which bears upon this point.

*The Arru Islands.*—This group of Islands is situated on the northern verge of the Great Australian Bank, and extends from N. to S. about 100 miles; but as the eastern side of the group has not been explored, its limits in that direction are uncertain. Some of the southern islands are of considerable extent, but those to the N., lying close to the edge of the bank, are rarely more than 5 or 6 miles in circumference. The land is low, being only a few feet above the level of the sea, except in spots where patches of rock rise to the height of 20 feet, but the lofty trees which cover the face of the country give to it the appearance of being much more elevated. Coral reefs extend from the shores of all the islands, and in the eastern parts of the group these are often of great extent. The islands are divided from each other by narrow channels some of which are of great depth, and in one of these there is said to be a whirlpool of so formidable a description that the natives will not venture to approach it even in their larger vessels. I regret that during my recent visit to these islands my time was so much occupied by inquiries connected with the expedition to which I was attached, that I could not ascertain this fact from personal observation. Upon the whole, it is evident that this group has not been left quite untouched by the convulsion which has shaken its neighbours, a circumstance that might naturally be expected from its position on the very edge of the bank, and in the close vicinity of the volcanic chain, the Great Ki Island being only 60 miles distant.

When it is taken into consideration that the primary mountain ranges both in south-eastern Asia and in Australia, pursue a precisely similar direction, and that the westernmost Asiatic range, if continued, would strike about the N. W. Cape where the western Australian range commences, while banks extending from both these continents actually approach to, within 450 miles of each other, the question naturally

arises as to whether these continents were ever united. This inquiry, however, would lead to details of too extensive a nature to be admissible in a paper of this description, and which would belong rather to geology than geography, but it is well deserving of being followed up, since it possesses an interest beyond that which attaches to geographical matters generally; for if it be found that the mountain ranges of Australia are a continuation of those of eastern Asia, we may expect that they will also afford the mineral wealth for which the latter are so celebrated. Our colonies in Australia are now in a condition which would render the discovery of valuable minerals of the very highest importance. The amount of agricultural produce raised in these colonies is considerably above that required for the consumption of the inhabitants, who are now anxiously looking about the world for a market for their surplus produce, and such a market would be afforded by a population employed in mining operations. We may reasonably expect that mineral wealth is not confined to the district of South Australia. The great range extending the entire length of the N. E. coast is of a very promising description, as is also the range which abuts on the N. coast near the new settlement at Port Essington, and which, if it preserve the same direction which is observed in the other Australian ranges, may be connected with that of South Australia. The Liverpool, Adelaide, and Alligator rivers, the largest yet discovered in Australia, appear to have their sources in this range.

In conclusion, I will venture to suggest that the great banks alluded to in this part might be introduced into our maps of the Indian Archipelago with very good effect, and if delineated by means of the dotted lines, would rather improve their appearance than otherwise, while at the same time they would tend to illustrate to a certain degree the geological character of these countries. We have ample data from which to define their limits, except at the single point to which I have alluded in this paper, with regard to the S. W. extremity of Celebes.

The above was reprinted with the Journal Indian Archipelago from the "Transactions of the Royal Geographical Society" of London for the year 1845 (vol. XV. p. 358). The paper was submitted to the Society by the writer soon after his return to England from this part of the world in April 1845, and was intended as the first of a series of essays, suggesting points of geographical enquiry necessary to complete a system that would classify the productive character of the principal islands of the Indian Archipelago,—but circumstances rendered it advisable that the series should

be discontinued. Up to that period the narratives of travellers in the Indian Archipelago, although replete with valuable information, were generally deficient in those details necessary to complete a geographical system that would meet the requirements of the day;—indeed the extent and direction of the volcanic band which traverses the Archipelago, although studded with European settlements, was still undetermined; the active volcanoes supposed to exist near the northwest extreme of Borneo, and on Cape Island in Torres Strait, not having yet been erased from the maps by authority. But during the seven years that have since elapsed geographical research has progressed with such rapidity in this part of the world, that the general outline of its physical structure has been completed, although much remains to be done in the way of filling up the details. The surveying expeditions directed by the English government to those points where researches could be prosecuted without exciting the jealousy of other nations, have determined the character of Palawan, North-western Borneo, the eastern part of New Guinea and of the Louisiade group, while the scientific enquiries set on foot by the Netherlands Government with the view of developing the resources of its Eastern possessions have greatly enlarged our knowledge of the southern portion of the Archipelago. And, lastly, the Journal for which this essay is intended has been the means of bringing together, a mass of practicable information illustrating the geography of South Eastern Asia and the Indian Archipelago, as creditable to the collector as to the community which has supported his undertaking. In Australia, also, the progress of discovery has been so rapid and effectual, as to excite a feeling allied to astonishment, in those who have been accustomed to trace the slow but steady advance of the early explorers. This new impulse, which will soon leave nothing more to be done in the way of Australian inland discovery, was commenced by a traveller who possessed in an eminent degree that combination of courage and caution necessary to conduct a small party through regions occupied by wild tribes, together with a sound practical knowledge of all those branches of science to which the attention of travellers in unexplored countries should be directed. Alas! that I should have to speak in the past tense of a traveller whose career had scarcely been commenced, and whose generous devotion to the cause led him to undertake a journey calculated to decide at once all the remaining points necessary to complete a system of Australian geography. But the most sanguine have ceased to hope that even Leichhardt's dauntless spirit can have withstood the privations entailed by a protracted wandering in the wilderness.



But before entering again on the subject of physical geography, I find it necessary to state explicitly that the possibility of a connection having once existed between Asia and Australia, which I had advanced as the great incentive to further enquiry, was disputed at the general meeting of the Geographical Society before which it was read, by one of the leading members, whose high reputation as a proficient in the science of geology entitled his opinion to great weight. This opposition was founded on the conclusions arrived at by the celebrated comparative anatomist, Professor Owen, from an examination of remains of extinct Australian mammals, and which had been developed at the meeting of the British Association of the previous year. These conclusions had been adopted by some of the leading geologists, as will be seen by the following extract from the Presidential Address delivered at the Anniversary Meeting of the Royal Geographical Society which took place about the time.

The Transactions of the British Association, contain the admirable report of Professor Owen on the extinct mammals of Australia, and from evidence offered by his own Science, this great Comparative anatomist takes the broadest and soundest views of the connexion between the ancient and modern distribution of masses of land. Showing us that, as a whole, the extinct quadrupeds of our islands are closely analogous to those of the continents of Europe and Asia, and that these quarters of the globe are separated by no natural boundaries which could have caused great variation in the distribution of animal life. Professor Owen infers that England must have been a portion of the Continent, when it was tenanted with the same species of now extinct elephants, rhinoceroses, hippopotami, bisons, hyænas, tigers, bears, &c., inhabitants of the common Continent: even Africa is, on one of its flanks, so slightly divided from the rest of the old world of the geographer, that its existing races of mammals in some sort intermingle; though certain quadrupeds, as the giraffe and hippopotamus, which have become extinct in Europe and Asia, still exist in Africa. But when we cast our eyes to Australia on the one hand, or to South America on the other, then is the fauna as entirely dissimilar in each, as we should expect to find it in countries partitioned off by such wide seas and great natural barriers. From observing the fact, that the fossil mammalian remains of these two continents are as unlike those of Europe, Asia and Africa, as their present quadrupeds, Professor Owen rightly concludes "that the same forms were restricted to the same provinces at a former geological period, as they are at the present day;" and thus he sustains the views of modern geologists, that in those periods immediately anterior to our own, the geographical features of the earth must have been the same as those which now prevail.

*Address to the Anniversary Meeting of the Royal Geographical Society, 26th May 1845, by Sir Roderick Impey Murchison, V. P. R. S. L. G. S., &c. Sec., President, p. 75.*

An examination of specimens of Australian fossil Flora brought to England by Count Strzelecki in 1844 and which had been submitted to Mr. J. Morris for comparison, presented very different results, as appeared in the following extract from his report:

"In instituting a comparison between the species collected from the Australian deposits, and those described from the Burdwan coal-fields by Professor Royle, we observe both the remarkable analogy of form of some species, and the actual identity of others; from which we may probably be led to infer that the deposition of the strata containing them was not only contemporaneous, but that the conditions of the flora of some portions of the Indian and Australian Continents, at that epoch, were not very dissimilar."—Strzelecki's Physical Description of New South Wales, p. 253.

The recent discovery of fossils of well known "Silurian" species in the mountain ranges of New South Wales, has further established the fact that Australia is not an outcast from the family of continents, notwithstanding Blumenbach's famous theory. It is true that the fossil remains of mammals discovered in the limestone caverns of the Wellington range and the Kanobolus are all of the marsupial character, but this merely proves that if mammals of the forms now existing in Europe and Asia ever inhabited Australia previous to their introduction by man (which is by no means probable) they deposited their bones elsewhere.

But to return to the subject under review. The great desideratum of 1845 was a more perfect knowledge respecting the arrangement and distribution of those tracts of land which shewed distinct proof of disturbance by volcanic action, yet retained in some degree the characteristics of primary formations. I had an opportunity of inspecting the eastern extremity of one of these tracts in 1832 when on the south coast of Java. It is thus described in Dr. Horsfield's "Mineralogical Sketch of the Island of Java," which is inserted in the general map of that island by Sir Stamford Raffles, in his "History of Java." "Extensive district of secondary volcanoes mixed with hills of Limestone, especially near the sea, where the Limestone rocks are piled up to great heights—basals Basalt and Wackem, Breccia in the beds of rivers;—also Porphyry, Jasper, Cornelian, Agate, Obsidian. In some places Quartz appearing in Rock-crystals, Prase or Amethyst, rarely siliceous petrefac-

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opportunity of inspecting one of the larger and less dependent areas of this formation, on the occasion of a journey across Moa, one of the lands lying immediately to the east of Timor, which appeared to consist of a mass of land, upheaved to its present elevation without any further disturbance of the strata, than was just sufficient to show that the remains of marine animals of forms corresponding with those still existing in the neighbouring waters, which are scattered pretty plentifully over this island, owed their presence rather to the upheaval of the land, than to the retreat of the waters which must once have covered a portion of its surface. But it is on the neighbouring Island of Timor, where the line of subterranean action has crossed primary ranges, that the evidence of this simple upheaval is most striking and distinct. There masses of land of purely primary formation, with the animal and vegetable kingdoms closely corresponding with those of the neighbouring continent of Australia, are found lying on tracts sprinkled with corals and marine shells, some hundreds (indeed I may safely say, thousands) of feet above the present level of the ocean. That these tracts owe their elevation to upheaval, may be inferred from the circumstance of the process being still active, a fact that can be ascertained without much investigation at the principal European ports, Dilli and Copang ;—in the former by comparing the present elevation of the reef of coral which forms the harbour, with the accounts given in the old Directories, and in the latter by inspecting the madreporic cliff on the brow of which part of the town is erected.

These "Areas of Upheaval" as I have been induced to name them, include at least as large a portion of territory in the Indian Archipelago as that occupied by the active Volcanic Bands, in which nearly all traces of former character is lost in the chaos that has been produced by the intensity of the volcanic heat. The leading characteristics of the "Areas of Upheaval" consist in the general distribution of limestone formations, often in the form of the "mountain limestone" of England,—in the presence of pretruded minerals in those spots where the line of upheaval has crossed primary ranges, and the subterranean heat has been sufficiently great to project the metals ;—and in the prevalence of upraised coal beds where the subterranean force has been so slight as to be exhibited only in upheaval, without great disturbance of the strata.

*Primary Ranges.*—With a view to simplicity of arrangement, I include under this term all formations antecedent to the recent volcanic epoch, adopting as a test the presence of primitive granite in situ. During the last few years, much additional information has been obtained respecting the ranges of South Eastern Asia.

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Of the Malayan Range, the limits are pretty accurately defined by the coast lines of the Peninsula. Some valuable information has been obtained respecting the range which runs along the western coast of the Indo Chinese Peninsula, dividing the ancient Kingdoms of Cambodia and Laos from that of Siam. See Journal of the Indian Archipelago vol. v. p. 306. This range ceases as a continued chain at Kampot in Lat.  $11^{\circ}$  S. but is continued by isolated hills and ranges to the south extreme of the Peninsula. No addition has been made to our knowledge of the Anam or Cochin-Chinese range, beyond a confirmation of the fact that it runs parallel to the east coast of the Peninsula throughout its length.

In my essay of 1845, he remarks, I have continued the Cambodian Range from the northwest extreme of Borneo to Gunung Ratos, near Banjar Massin, an error into which I was led from it being the only primary range on the coast of Borneo with whose extent I was then acquainted. I must have fallen into this error from information received during my visit to Borneo in 1834, as I find these ranges thus alluded to in a paper on the Geography of Borneo which I drew up at the request of the late Sir Alexander Johnston in 1837, and which is published in the Transactions of the Royal Asiatic Society for that year.

"One of the Eastern Asiatic ranges, after extending along the S. W. coast of Sumatra, terminates at its S. E. point. Another runs along the Malay Peninsula, is lost for a time, but appears again in the high peak of Lingin, and terminates in Banca and Billiton, and a branch from this separates at Pulo Timoan, on the east coast of the Peninsula, and ends at Carimata, in the strait between Billiton and Borneo. Two ranges traverse Cambodia and Cochin-China in the same direction, and these will be found to extend to, and, perhaps, to traverse Borneo. Between the Cambodian range and the mountains at Sarawak, on the northwest extremity of Borneo, the Natunas islands and Pulo Condor form the connecting link ; and as the Sarawak hills run to the south-east, the range is probably continued, either by a connected line, or by isolated mounts, until it terminates in the Gunung Ratos, near Cape Selatan." More recent data shew that this range, after traversing the western part of Borneo, terminates on the south coast, a little to the eastward of Kotaringin. The Gunung Ratos would therefore appear to have been formerly connected with the primary range which shews at Bintulu, on the northwest coast of Borneo, and which may be a continuation of one of the Indo Chinese ranges. The Anam or Cochin-Chinese Range is that which can be traced most distinctly across the Archipelago to Australia at the present day.



The interval between Cochin-China and Borneo will appear great, unless we consider the reefs and shoals which extend across this part of the China Sea, to be submerged links of the chain. When once across this submerged area, the primary ranges of Cape Kaneungan and the southern limbs of Celebes continue with little interruption to a point only 240 miles distant from the outer verge of the Australian Bank of Soundings, and no great stretch of the imagination is required to carry it on to the upheaved remains of primary formation in Timor, and thence to the Arnhem Peninsula in Australia.

The *Sumatran chain* must be dismissed from the list of primary ranges; for although it evidently has been of this formation, and was probably connected with the continent of Asia by a line passing through the Nicobars and Andamans, yet the strata have been so disturbed by the volcanic band which extends along the western coast, that no portion of the old formation has been detected in situ. An area of upheaval seems to extend along the centre of the island from one extremity to the other, but the great breadth of the alluvial plains which form the eastern coast, from Diamond Point to the Strait of Sunda, has hitherto prevented a close inspection except in two or three spots. If the laws which regulate the deposition of the substances from which coal is formed, and the upheaval of the beds into positions available for the use of man, are the same here as in Australia, the inland parts of Sumatra opposite this settlement are likely to contain coal beds at least as extensive as those of New South Wales, but the width of the alluvial plains lying at the base of the area of upheaval will render them more difficult to discover, as the cliffs in which the coal crops out on the east coast of Australia rise abruptly from the sea-shore, and the beds can be detected from boats passing close along the land.

In the Philippine Islands, Mindanao, the Gilolo Group, and in the western peninsula of New Guinea, distinct traces of the former existence of primary formations are shewn by the presence of the descriptions of minerals which are less liable to destruction by intense volcanic heat. But as far as my experience goes, no particle of this formation in its primitive state has been detected throughout the groups which form the eastern barrier of the Archipelago.

In Australia the most important modern discovery connected with physical geography, was made by Dr. Leichhardt during his memorable overland journey from Moreton Bay to Port Essington in 1845, during which he established the connection between the Monobar Range which abuts on the north coast near the Cobourg Peninsula, and the great eastern coast range, from which it appears to branch off about the

parallel of the tropic. Leichhardt only traced the range across the Arnhem Peninsula, and along the southwestern side of the Gulf of Carpentaria, a distance of about 600 miles, but its continuation in the same direction can scarcely be considered problematical, as at the furthest point reached by Sir Thomas Mitchell in the following year (about Lat. 24° Long. 145°) the country dipped to the southward towards the stony desert discovered by Captain Sturt during the previous year (1845) near the northern boundary of the South Australian colony. In my former essay, he continues, I anticipated that the Monobar Range would be continued to the neighbourhood of Spencer Gulf, but if a branch had extended in this direction, Captain Sturt, must have met with it during his late perilous journey in the interior. The direction taken by the South Australian ranges is still undetermined, although it can scarcely be considered doubtful. This, the only remaining point necessary to complete our acquaintance with the general physical structure of Australia, would have been decided had Dr. Leichhardt survived to complete his last journey. At present, the honor of being the first to trace the course of this central range appears likely to fall upon the enterprising colonists of South Australia, who have already pushed their exploration from the west side of Spencer Gulf along the range to the northwest, and the result is calculated to encourage them in the further prosecution of their enterprize.

The primary ranges rarely attain a very great elevation, about 6,000 feet being the highest point. In this particular they are far inferior to the volcanic and upheaved ranges, but this deficiency is amply compensated by their excessive width, indeed each range seems to consist of a number of small parallel ranges overlying primary bases sometimes as much as 300 miles, and rarely less than 100 miles, in breadth. The higher points are generally massive and rounded, although peaked mounts are not uncommon, especially in the neighbourhood of the volcanic bands. The only known table-lands of large extent are those of Laos or Upper Cambodia, and the plains discovered by Sir Thomas Mitchell in 1846 near the northern boundary of New South Wales. The latter are 2000 feet above the level of the sea.

*Productive Character.*—The primary ranges in South-eastern Asia and the Indian Archipelago are all more or less metalliferous, but the labour of working under ground, and extracting the metals from the matrix, is so unsuited to the habits of the natives, that mining operations are only carried on in those countries which are subjected to despotic governments. Lead mines are worked in that part of the Malayan Range which traverses the kingdom of Ava; and copper-

mines have been opened in the Anam or Cochin Chinese range, the produce of which is equal in quality to South American copper, but inferior to that of Japan. The produce of these mines has been imported into Singapore, that of Anam in considerable quantities, but the cessation of commercial intercourse has put a stop to the importation. Iron is also smelted from the native ores on the western side of the Anam range, and it is said that silver mines are also worked, but I cannot vouch for the correctness of the report. Elsewhere in this region, mining operations are confined to the collection of metals that have been projected from the original site by subterranean heat, which can be traced distinctly to recent volcanic action. The tin of the Malay Peninsula, Banka, and Billiton, and the gold of the Peninsula, Borneo and Celebes, are all collected from the detritus in which the projected metal has been deposited. Lead and antimony ores are found in the Cambodian Range to the north of Kampot, but no mines have been opened.

In Australia, the southern portions only of the primary ranges have been attentively examined, but as far as the search has been extended, it would go to prove that the primary formations of this continent are equally metalliferous with those of South Eastern Asia. Copper ores have been found at Port Curtis, near the southern extremity of the range which extends along the northeast coast, and as long ago as 1802. Flinders met with indications of copper at Goods Island in Torres Strait; but his suggestion does not seem to have been followed up by the naturalists attached to subsequent expeditions. The stone is granitic and brittle; but there is also porphyry, and in one place I found streaks of verdigris, as if the cliffs above had contained copper ore." (Flinders' Voyage to Terra Australis, vol. II. p. 120.) Lead and copper mines have been worked in South Australia for some years past, and others have been opened recently in the western coast range, a little to the north of Swan River. The massive range, which extends from Cape Lieuwin to Cape Naturalists does not appear to have yet been explored, but from a cursory examination of its southern extremity during a residence in the neighbourhood in 1831, I was led to suspect that this southwestern peninsula might some day become the Cornwall of Australia. Hematitic and specular iron ore and copper pyrites, have been found on the northwest coast near Admiralty Gulf, which may be considered sufficient to establish the metalliferous character of the northern part of the Central Ranges.

The productive character of the surface soil of this formation, which consists chiefly of decomposed sandstone and crystalline rock, is inferior to that of both the other areas, indeed it is only in the great river basins, which are favourably

situated for irrigation, that agricultural produce is raised in sufficient quantities to allow a surplus for exportation. But on the other hand the superior quality of the forest timber which overspreads this area is daily becoming more appreciated, and probably many valuable gums and guttas still remain to be discovered. In Australia, the prevailing vegetation differs materially in its character from that of south-eastern Asia, the forms now existing throughout the interior of Australia being identical with those discovered in the coal beds of New South Wales, and, it would seem, in those of Upper India also. The process by which the existing forms of Indian vegetation have been introduced, may be traced in the following extract from a little work describing the Cobourg Peninsula Port Essington, which was published by the writer when last in England:—

"Throughout the Cobourg Peninsula, generally near the sea-shore, are found patches of land varying in extent from two or three acres to fifty acres and upwards, on which the vegetation is perfectly in character with that of the Islands of the Indian Archipelago. These spots are covered with a thick jungle, difficult to penetrate, and the trees are often of an enormous size. Among these I have recognized the waringin, or banyan-tree of Indian Islands; the kanuri, (a tree producing a nut which yields a kind of a sweet-oil, and under the shade of which the nutmeg trees are planted at Banda,) together with many others common to the Spice Islands. The shrubs, and even the birds that inhabit these patches, are also in character with those of the Indian Islands; the kangaroo which seeks shelter here from its enemy, the native dog, being almost the only peculiarly Australian animal that is found in them and these obtain their food in the open grounds.

"The plants obtained from the countries of the Archipelago that are of the primary formation, invariably flourished better than those from the volcanic islands; the productions of Singapore and of the Malayan Peninsula adapting themselves at once to their new quarters. This is accounted for by the circumstance of the soil, and even the rocks and stones of the Northern coasts of Australia being precisely similar in their character to those of the countries in the south-eastern parts of Asia. Even the general direction taken by the hill ranges is the same in both countries, and were it not that they are separated by a narrow but unfathomable gorge, studded with volcanic islands, they might be considered as forming portions of the same region. The indigenous productions of the soil certainly differ considerably in their character, but a process is at present going on in Australia which, in the course of time, if left untouched, would produce a similarity upon this point.



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Innumerable patches of oriental vegetation, many of them thousands of acres in extent, are spreading inland from the northern and eastern coasts, even in spots far beyond the tropics, eating up, as it were, the Australian vegetation, which disappears before them as the marsupials disappear before the animals of Europe. Every inch of ground gaisted is made good. The dense foliage, impervious to the sun's rays, spreads out above, sheltering the mass of dark vegetation that accumulates on the surface of the ground, which is thus left to rot and form new soil."—*Enterprise in Tropical Australia* pp. 76 and 106.

The leading feature of an Australian landscape consists in the open nature of the forest, which proves highly favourable to pastoral pursuits. Owing to the comparative poverty of the soil, the growth of the forest trees is slow, producing that durability in the timber for which the English oak is so esteemed, but in a much greater degree, the wood of several of the prevailing forms of the Eucalyptus being apparently indestructible except by fire, and then it burns with slowness, throwing out a heat scarcely inferior to that produced from coal: indeed the common gum wood, burning in the gally range of a frigate, when the flame ceases, can scarcely be distinguished from a glowing sea-coal fire. Stumps of trees cut down in the neighbourhood of Sydney in 1788 were still standing in 1847 without any other appearance of decay than the destruction of the bark, and will probably, if undisturbed, continue in the same state for a century to come. But the chief value of this timber consists in several varieties being obnoxious to the teredo or worm which perforates and destroys submerged timber, and proves so destructive to ships bottoms and wooden piles, especially in these tropical regions. The piles that were driven in 1838 to form the jetty at Port Essington, were perfectly sound when the settlement was abandoned ten years afterwards, while foreign timber that was allowed to remain in the water alongside the pier only for a few days, was invariably attacked by the teredo.

Up to a very recent period the submerged banks which extend from Asia and Australia furnished the principal articles of commerce supplied by the primary region. Agaragar, a marine lichen extensively used in China, trepang or sea slug, and mother of pearl shell, are common to both banks, but the Australian bank is by far the most productive, probably from its not having yet been so extensively worked as the Asiatic bank.

*III. Volcanic Bands.*—The limits of the volcanic band which crosses the Archipelago are so distinctly defined by the active volcanoes with which it is studded, that no difficulty is experienced in tracing its course. The few facts that our limited knowledge of the laws

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which regulate volcanic currents have enabled me to collect, lead to the inference that the volcanic stream originally commenced in the neighbourhood of Kamtschatka from which it takes a southwest direction through the Kurile Islands, Japan, and Loo Choo, skirting the Coast of Asia, to Formosa, where it abruptly turns to the south and southwest through the Philippines and Mindanao to the Moluccas, embracing the eastern extreme of Celebes and the western Peninsula of New Guinea, and then curves to the westward along the Tran Javan Chain to the Strait of Sunda, when it assumes a northwesterly direction through Sumatra and the Andamans to Cheduba island, in the northern part of the Bay of Bengal. It is not without a certain degree of hesitation that I have continued the band from the western extreme of New Guinea along the north coast of that island to New Britain, although its volcanic character has been decided by recent French navigators, for there remains a tract including thirteen degrees of longitude in which no active volcano has been seen. Indeed it is by no means improbable that the band which takes a southerly direction from Japan through Fatzima, the Bonin and Mariana Islands, may prove to be continued to New Ireland; in which case the chain of active volcanoes which extends through the Solomon Islands and the New Hebrides to New Zealand, and perhaps further to the south, may indicate the course of an independent stream.

It is to be regretted that no series of observations has yet been made on the periods of volcanic activity in different parts of the bands, as a mere daily record kept at the European settlements which are scattered along them, from Kamtschatka to New Zealand, and from the Moluccas to Bengal, during only a single year, would furnish data from which important points could be decided, that can now be only matters of conjecture. Indeed there can be no objection to such a simple and inexpensive series of observations being carried out throughout the world. The lines of volcanic action which have all but separated Europe and Asia from Africa, and the northern from the southern continent of America, have evidently been ruled by the same law with that which has effected the separation of eastern Asia from Australia; and the question must soon be boldly entertained whether the circulation of volcanic electricity is not as necessary to maintain the productive character of the globe, as that of the blood to preserve vital existence in the human body. But it is in the Indian Archipelago, where the process by which volcanic regions have been formed is still actively progressing, and where the smooth seas afford easy access to all the chief points of interest, that the greatest facilities are afforded for prosecuting the

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researches necessary to establish the basis of a system.

In these regions, so great has been the intensity of the subterranean heat, that where the volcanic bands have crossed or passed along ranges of the primary formation, scarcely a vestige of their former character remains, the primitive rocks being metamorphosed, and even the metals they contained melted up and dissipated; with the single exception of the most indestructible of all metallic substances, gold; the presence of which in minute grains, deposited in the beds of mountain streams, being, he says, as far as I have been able to discover, the only evidence that now remains to point out the former existence of primary ranges.

The process by which the volcanic formations have been thrown up, and by which large tracts of land in which the subterranean action has not broken through the surface have been raised to their present level, seems invariably to have been attended by a corresponding subsidence of the surface in their immediate neighbourhood;—indeed the facts brought forward by Mr. Darwin, in his essay on the “Structure and Distribution of Coral Reefs” go to prove that this subsidence still continues in those parts which are not affected by active subterranean force. The banks of soundings which extend from Asia and Australia present features which must class them as “Areas of Subsidence”; with the exception of certain spots which have been penetrated by lines of upheaval, and where the fringing reefs distinctly point out the character of the rocks and islets. Beyond the limits of these “Banks of Soundings” the sea is everywhere unfathomable a mile or two from the shore, indeed in many spots, no soundings can be obtained with an ordinary deep sea lead line from the brow of the limestone cliffs which often bound the shores of areas of upheaval. Even where the banks of soundings have been penetrated by areas of upheaval the depth of water is greater than elsewhere, and the shores, instead of sloping gradually into the sea, fall at once to depths corresponding with those of the bank generally. This is particularly apparent on the north-west coast of Borneo, in the neighbourhood of Bawian and Salombo, and on the western side of the Gulf or Carpentaria.

**Productions**—The productive character of the volcanic area is totally distinct from that of the primary formations. With the exception of gold, which is found scattered in minute particles in the beds of the mountain streams, no single production of the primary areas repays the labour of collection. This deficiency is amply compensated by the surpassing richness of the soil produced from the volcanic rock, which decomposes rapidly before the influence of the atmosphere. The natural productions are un-

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important, the nutmeg, which is scattered over that portion of the band which approaches the continent of Australia, being almost the sole exception. But the docility of the native inhabitants proved to be such that they were easily coerced to labour, and the curved volcanic band which traverses the Archipelago became studded with European settlements throughout its length and breadth, which now yield the great bulk of the produce exported from the Indian Archipelago. In the northern part of the Philippines, the famed Manila tobacco is the chief production; sugar plantations, which supply the Australian colonies, occupy the centre; and the *musa textilis* which yields the Manila Hemp is the chief product of the south. Spices are almost the sole production of the Dutch settlements of the Moluccas, inferior articles being neglected, as is the case in countries which produce gold. Some islands east of Java are still independent of European control, and these yield productions suited to the wants of the natives to such an extent as to give rise to an export trade with all parts of the Archipelago. In Java, coffee, sugar, rice, and tobacco, are the most important articles, the two first being exported to Holland in immense quantities. Coffee and pepper are the chief products of Sumatra, where the soil is less fertile than in some of the other islands of the band. The volcanic agency here becomes comparatively weak, and is confined to the outer coast of the island; where, being backed by an area of upheaval, the greater portion of the alluvium descends into the sea and is lost. I have not, he says, sufficient data to enable me to define the area of upheaval which intervenes the volcanic band and the north-eastern coast from the neighbourhood of Palembang northward, but its existence is distinctly shewn in the detritus brought down by the rivers. It is probably owing to this circumstance that the alluvial plains of Sumatra which abut on the Great Asiatic Bank are less fertile than those of Java, where the alluvium almost exclusively consists of decomposed volcanic rock.

**IV. Areas of Upheaval.**—Under this head are included all those masses of land which furnish evidence of having been raised to their present level by subterranean action, but in which the volcanic heat has either never found vent in the surface, or has subsided at periods anterior to the present epoch. These areas may be subdivided into two classes;—the first consisting of spurs extending from the western side of the volcanic band which bounds the Archipelago to the eastward; the other consisting of masses of upheaval land lying parallel and adjacent to the volcanic band. The first subdivision displays crystalline, igneous and aqueous rocks, upraised occasionally to immense elevations, with every degree of disturbance.



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from mere dislocation of the strata, to a state of chaos scarcely inferior to that of the volcanic areas. In fact these spurs furnish intrinsic evidence of having once been traversed by volcanic streams whose activity has ceased, probably at the period in which the stream finally succeeding in breaking across the primary ranges at a point where they offered least resistance. The prevalence of limestone formations, often exhibiting fossil remains of still existing species of marine animals, is the leading feature both of the larger and smaller areas, indeed the latter only differ from the others in being immediately dependent on the volcanic band.

Commencing to the north, the first area of upheaval can be traced from the neighbourhood of Manila in the Philippines through Mindora, Palawan, and along the northwestern part of Borneo, where the subterranean force has penetrated and piled up the primary ranges, but appears to have been stopped by the westernmost range, which, although disturbed, has not been broken through. The absence of any other visible cause, leads me to attribute the extraordinary projection of metal into the surface soil at the western base of the range, to the agency of this once active volcanic stream, but it is only recently that I have been able thus to account for the phenomena which I met with when inspecting the gold mines of Montradok in 1834. "The Eastern Seas &c. p. 281 et seq." This rule will be found equally applicable to the gold deposits of the Malayan Peninsula, Sumatra, Celebes, Timor, and New South Wales, the deposits being only found on the side of the range opposite to that against which the volcanic force has been directed.

A second area extends from Mindanao through the Sulu chain to the northeast extreme of Borneo, but its further progress cannot be traced until we are better acquainted with the geography of the interior of that island. A third line extends from the north-east extreme of Celebes, where the Klobat Mountain is still an active volcano through the northern peninsula of that island, and small areas of upheaval, with a corresponding subsidence of the adjacent surface, can be traced through the Lifle Paternosters, Pulo Laut, and Salombo, to Bawian. The subterranean force which has elevated Madura, and the chain of islands extending from it to the eastward, may have come from the north, but as the volcanic land passes in the immediate neighbourhood, it will not be safe to include these islands in an independent area of upheaval, until geological investigation shall have shewn their character to correspond with that of other parts of the area.

The eastern peninsula of Celebes, the Xulla Isles, Buru, Ceram and Mysol, all belong to this system, and I should be inclined to trace

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the line of upheaval from the neighbourhood of New Guinea, but some confusion exists hereabouts which cannot be cleared up without further enquiries. In all the recent physical maps that I have had access to, an active volcano is laid down as existing in the north-west part of Amboyna. As no mention is made by Valentyn or other old writers of an active volcano in this neighbourhood, I was not very minute in my enquiries when there in 1842, being satisfied that the southern peninsula possessed, in an eminent degree, all the characteristics of upheaval without great disturbance of the surface;—the limestone formations, especially, being apparently in the same relative position as when first formed.

But as this volcano must have been placed there on authority, I am not inclined to pronounce against its existence, especially as the range in the eastern part of Celebes is deflected to the south, or at right angles to the course of simple upheaval in that vicinity. In this case a volcanic band must be introduced as passing south from Gilolo through Ceram and Amboyna to the isolated volcano distant 180 miles to the S. S. W. of the latter Island. Should this prove to be the fact, a volcanic band will either have crossed an area of upheaval or must have thrown out lines of upheaval simultaneously to the right and left, phenomena which do not appear in other parts of the Archipelago.

The fourth area of upheaval extends from the southern part of the western peninsula of New Guinea through the Keli Islands, Timor Laut, the Serwathy Islands, and Timor, to Sumba, or Sandalwood Island. A recent volcanic band skirts the northwestern part of this area rather closely, Serua, Nila, and Damma having been active volcanoes since the arrival of Europeans in the Archipelago, but they are now either extinct, or very rarely in a state of activity. In my essay of 1845 I have pronounced the peaked mountain at the north-east extreme of Timor to be in a state of activity, having been induced to do so by the reports of natives of the adjacent island Kissa, and from my having on two several occasions seen the summit of the mountain in a state of ignition, but I have since been informed by gentlemen connected with the Portuguese settlements in Timor, that there are no active volcanoes in the eastern part of the Island. I must there have been deceived by the burnings of the jungle which the natives make towards the close of the year, for the purpose of clearing new lands for cultivation.

The eastern Islands of the Arru Group have been upheaved to the height of from 80 to 150 feet, a fact I was not made acquainted with till recently, although I had detected evidence of disturbance when visiting the half drowned western Islands of the group. As the animal and veg-

table kingdoms still correspond very closely with those of Australia, these Islands afford a clue to the former condition of the area now occupied by the great Australian Bank. So long ago as 1837, the writer endeavoured to draw attention to the Arru Group in a paper detailing the few important facts that were known concerning it, which was read at a meeting of the Geographical Society; but with the exception of a flying visit to the western part by Commodore D'Urville in 1839, when on his way from Port Essington to Torres Strait, and an equally hasty exploration we made in H. M. S. *Britomart* in 1842, nothing has been done towards extending our geographical knowledge of this group. The Dutch scientific expedition of 1827, which has contributed so much towards dissipating the cloud of mystery that hangs over these eastern islands, passed near the group on more than one occasion without calling; but it is to be hoped that the spirit of enquiry which is now predominant in Netherlands India, will not allow this small but interesting portion of its territory to remain a terra incognita.

The area next in rotation is that which extends along the centre of the greater or eastern Peninsula of New Guinea, at least. I have been induced to class this great mountain range as an area of upheaval. The western part of the range, which terminates at Cape Buro on the S. W. coast, has been known for nearly three centuries, and is named in the old Dutch Charts "*Sneeuw Bergen*" or the Snowy Mountains, owing to the upper portion of the range, as seen from the coast, appearing from its dazzling whiteness, especially when the sun is near the horizon, to be covered with perpetual snow. The altitude of this part of the range, as estimated by the officers of the Dutch corvette "*Triton*" in 1828, is only exceeded in this part of the world by that of the Himalaya. The eastern part of the range has lately been seen by Captains Blackwood and Stanley, and was found to consist of very high land, but scarcely attaining half the elevation assigned to the western portion. Captain Stanley did not survive to reach England, or he would probably have furnished some interesting details respecting this region. From the published narrative of his voyage, it would appear that the S. E. extreme of New Guinea, beyond the parallel of 9° S. is of primary formation. The central mass of mountain land has evidently been the result of upheaval, but whether the volcanic force is still active can only be decided when the range comes to be closely examined. I have therefore coloured this part yellow, as indicating simple upheaval.

Traces of upheaval are shown on the western coast of the Gulf of Carpentaria, by the notes of Captain Flinders in his "*Voyage to Terra Australis*," and by the description of the specimens

given by Dr. Fitten in his essay on the geology of Australia which is appended to Captain King's Narrative;—and evidence of the same nature was detected by Dr. Leichhardt in the interior of the Arnhem Peninsula, when crossing the line of action indicated by the direction of the ranges in the North-western horn of the Gulf of Carpentaria. Mountain limestone is also wanting to complete the resemblance of this area to that which extends from the south part of the Western Peninsula of New Guinea, named above the "*Timorian Area*." The essay of Dr. Fitton above alluded to, was read before the Geological Society of London in 1825. It is entitled "*an account of some Geological Specimens &c.*" but it is, in fact, a collection of all the geological data connected with Australia then extant, arranged and commented upon in a manner so eminently suggestive of points of enquiry, that the name of the author must be recorded as "*Father*" of the science of Physical Geography in Australia. Dr. Fitton's attention was particularly directed to the striking uniformity of arrangement that had been observed by Captain Flinders in the hill-ranges and chains of islands forming the northwest horn of the Gulf of Carpentaria, and their parallelism to the great range of Timor is distinctly noticed. Nor did he fail to call attention to the singular flat-topped hills which present so striking a feature on the northern coasts of Australia, and which had not yet been examined about the upper parts. Two of the most remarkable of these hills are situated on the Cobourg Peninsula, and were repeatedly examined by parties attached to the garrison of Port Essington. Dr. Fitton's anticipation of their importance as illustrative of physical geography, proved to be well founded; but as a description is not necessary to elucidate the particular subject now under review, I prefer making the "*Flat-topped Hills*" the subject of a separate essay.

The sixth and last area of the first class is found in the South-eastern part of Australia and in the eastern part of Van Diemen's Land. This area has been examined by one of the most practised observers of the day, the Count P. De Strzelecki, during a course of exploration extending over a period of five years, commencing in 1839, and the leading features of these important districts will be found fully described in his "*Physical Description of New South Wales and Van Diemen's Land*. London, 1845.—From a report of the proceedings of the Geological Society in the London Athenæum of February the 21st of this year, I perceive that two distinguished Geologists have brought their rival claims to the honor of having anticipated the discovery of gold in Australia, before that Society. A mere cursory perusal of Count Strzelecki's publication will be sufficient



to shew, that by proving the physical features of the Sydney mountain range to be identical with those of the Russian Ural, the great gold field of the day, he pronounced in language that could not be mistaken by the merest smatterer in Geology, the auriferous nature of its deposits. That he did not distinctly say "search and you will find," will be sufficiently understood and appreciated by those who are aware that such an announcement, although it might have had the effect of making him the idol of the Stock Exchange, was calculated to render valueless the pastoral property of those hospitable settlers who had received him with open arms throughout the southern colonies. Indeed the precious metal had already been discovered by an old shepherd of the Wellington district, (named MacGregor, if I remember right) who had long been in the habit of carrying with him specimens of gold embedded in quartz on his annual visits to Sydney with his flock of fat wethers. He did not disclose the locality in which he found them, but it was evident that he must have picked them up somewhere on his sheep-walk. In fact the Count must have repeatedly been made aware of the anxiety of the stock holders, who feared that MacGregor's discovery might lead the shepherds to neglect the flocks while searching for the precious metal. This man was as assuredly the discoverer of Australian Gold in the matrix, as was Mr. Hargreaves of the metaliferous deposits; but by far the greater merit is due to the latter, as his discovery was not the result of accident, but of deduction drawn from comparison with the Geological features of the auriferous regions in California.

But the most painful feature connected with the rival claims of the English Geologists, consists in the naturalist who first brought forward the scientific data on which anticipations could be founded being a foreigner, whose admiration of and confidence in the British character, led him to publish the result of his researches in London, under the auspices of one of the rival claimants for the honor of the discovery.

While on this subject, I cannot refrain from allusion to a practice that has recently come to be adopted by travellers;—that of submitting their rough journals to professional amanuenses or book-makers to be worked up for publication. These gentlemen are sometimes in the habit of engraving the observation of previous travellers, who from death or absence may not be in a position to claim their property on those of their principal without acknowledgment, or even the slightest allusion that might lead to references thinking thereby to enhance the reputation of the work they are employed to polish. This principle or rather want of principle has been particularly displayed, in some recent narratives of travellers in the Indian Archipelago. Sooner

or later these literary piracies must be detected, and when some Bancroft or Cooley of the next century employs his talents in separating the grain from the chaff, honorable names will have to bear the odium which should properly attach to those of unknown booksellers hacks.

The areas of the second class invariably extend in a direction corresponding with that of the part of the volcanic band on which they depend. Commencing to the north, the chain of islands which runs along the Tenasserim Coast, from Martaban to the neighbourhood of Penang, is an area of upheaval; and the contiguous coast affords evidence of having been subjected to the same influence. The southernmost point in which upheaved limestone has been detected, is at Pulo Bidan, a few miles to the north of Penang, but it would appear from the projection of the metals in a liquid state, that the whole of the Malayan Range, including Linga and Banka, have been effected by volcanic action. The chain of islands which extends along the west coast of Sumatra is of a similar character to the Tenasserim chain. These islands have been geologically described by Dr. Jack, who inspected the group at the instance of Sir Stamford Raffles when governor of Bencoolen (*Geol. Transactions*, 2nd series, vol. I.) The two areas of upheaval in Java are distinctly defined in Dr. Horsfield's Geological map. Their connection with the volcanic band cannot be doubted. The southeastern extreme of Java, the south point of Bali, and Banditti Island in the Straits of Lombok, are all upheaved table lands, bounded by precipitous limestone cliffs, several hundred feet in elevation. Areas of simple upheaval are found on the north side of the volcanic band at Flat island, Rusa Radgi and Lingit, and at the Iron Cape of Flores.

*Productive Character.*—The excessive fertility of soil which characterises the narrow band in which the volcanic stream is still active, does not extend to the areas in which the circulation has ceased. Nevertheless the fertilizing qualities of decomposed limestone have aided in forming a soil better adapted for the growth of produce necessary for the sustenance of man than the rich, fat, soils of the volcanic band. Maize, upland rice, yams, and other esculent roots here attain perfection, and the nourishing qualities of the produce are apparent in the superior vigour of inhabitants of areas of upheaval. The wheat grown in the uplands of Timor is remarkably rich in gluten, although the small size of the grain gives it an unfavourable appearance in European eyes. The cultivation of produce adapted for commerce is still in its infancy, owing to the lands of this formation having hitherto been neglected in favour of volcanic tracts, but its prospects are by no means disheartening. The coffee, cotton, cacao, and hemp (musa textiles),

growing on the upheaved areas, are the best produced in the Archipelago; although the soil is not calculated to produce sugar, or spice equal to that of the volcanic band. The mineral wealth of these areas is, however, more calculated to attract European enterprise. Coal has been found whenever it has been sought for with diligence in spots favourable for its deposit:—iron ore of excellent quality is abundant where the line of upheaval has crossed primary ranges;—and limestone, so necessary as a flux in smelting the metals, is found everywhere, so that the larger areas possess those elements that have mainly contributed to the prosperity of Great Britain. Fortunately, the gold deposits in the western parts of the Archipelago are now pretty well exhausted, and in the more remote regions, Timor, and possibly Sumba, are the only spots in which the steady course of industry is likely to be interrupted by the search for precious metals. The native chiefs of the former island, terrified by the rapacity of the early European navigators, are said to have combined in establishing a law which made searching for gold a capital crime, except on occasions in which it was thought proper to propitiate the deities by the dedication of a Bulan Mas or golden moon, when a human being was sacrificed to the spirits of the mines before the gold could be collected. This ceremony is probably alluded to in the "Account of Timor," published in Mr. Moor's "Notice of the Indian Archipelago. Appendix p. 6."

The name of the author is not given, and after diligent enquiry, I have been unable to trace his identity; but from the tenor of his remarks I suspect that he must have resided some time at Coupang, and collected his information concerning the more remote island from parties employed in the commerce of its dependencies; otherwise he could not have described Sumba as a low island, not much higher than Madura. Nevertheless I can affirm the general correctness of his observations, as I had Mr. Moor's book with me when I first visited Timor in 1836; and repeated visits during the five following years enabled me to make enquiries upon nearly every point he has brought forward. Mr. Hazart, who appears to have been the Resident of Coupang at the period of his sojourn, was so strongly impressed with a belief in the metalliferous wealth of the southern part of the island, that he would scarcely converse on any other subject, and his incessant appeals to the government led to a commission of enquiry, headed by M. Macklot, an eminent mineralogist being sent to Timor. An overland journey was made with a large party to Pilarang, where abundance of copper was found, but the strata had been so broken up, that mining operations could not have been prosecuted with advantage (see Journal I. A. Vol. IV. p. 495). The reputed

gold deposits, which lie on the south side of the island, were not examined. Quicksilver in a pure state is sometimes brought to Coupang by natives from the interior; and as the collection from the hollows of the rocks in which it is deposited does not entail heavy labour, it might become an article of commerce were its value known.

The Edible Nest which is constructed by the *Hirundo esculenta* in the caverns of the limestone cliffs is found throughout the areas of simple upheaval, but not elsewhere; so that this singular production, which forms its value is well known to those engaged in the commerce of the Archipelago, furnishes one of the best tests for deciding the character of the regions in which it is found.

#### *General Conclusions.*

In venturing to draw conclusions from the fact presented by a study of the Physical Geography of the Eastern Islands, I do not presume to trench upon that prescriptive right to generalize on the notes of travellers, which has for some years past been conceded to leaders of Geological Science, but rather to note those suggestions which naturally arise from extensive voyaging through a region whose physical character is yet undetermined. Until the general outlines, at least, have been ascertained, science must still be indebted to those travellers who have had opportunities of acquiring practical information, for that preliminary arrangement which men of science may extend to a system. That a connection once existed between Asia and Australia, is, I think, established by the simple facts brought forward by Mr. Morris in Count Strzelecki's work; indeed those who asserted contrary opinions in 1845 were (innocently, I am sure) supporting the famous spontaneous-development theory of the "Vestiges of Creation," which was exciting the indignation of the scientific world at the time. The opposition my suggestions then met with is not likely to be renewed, for the leading geologist of the day will scarcely repudiate a region that he has admitted into his own "Silurian" beds; and the Professor of comparative anatomy will probably reconsider the conclusions he ventured to draw from the facts presented by one of the minor branches of a science yet in its infancy.

Nevertheless, the facts established by Professor Owen in his essay on the Fossil Mammals of Australia, will prove of eminent importance in deciding the epoch at which the separation of the continents took place, for although the Professor's zeal leads him sometimes to give too much prominence to the science which he has made his own, no one can doubt the correctness of the practical results he has arrived at. The fact that no remains of mammals of more perfect forms than the marsupials were found among the numerous fossil specimens from Australia



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that were submitted to his examination, shew that the disconnection must have taken place during an epoch in which the marsupial was the only existing form of mammal in Australia and probably in Southern Asia also.

An enquiry into the distribution of the existing forms of mammals throughout the Indian Archipelago will throw some light on this interesting point. Commencing with the species common in Asia at the present day, and excluding those which may have been introduced in a domesticated state, such as the horse, dog, kine, and deer, the common Brown Monkey has penetrated farthest from the continent of Asia, as it extends through Sumatra and the Trans-Javan chain to the eastern extremity of Timor; but the thirty miles of strait which separates this Island from Latti seem to have stopped its further progress, for it is not found in a wild state in the Serwatty Group. To the north it extends through Borneo and Celebes, and is found in a single Island of the Molucca seas, Batchian. This animal, from its habit of frequenting the banks of rivers, is very liable to be carried out to sea in the masses of drift which are sometimes detached from the banks by the current, and its extensive distribution may be attributed to this cause. But such accidents are not likely to happen to the more bulky pachyderms, nor are the frail vessels of the natives calculated to transport them from Island to Island, so that an enquiry into the distribution of these monster mammals will best answer our purpose. In Borneo the Elephant co-exists with the Black Bear, (*Ursus malayanus*); the *Felis macrocelis*, or Sumatra Gigantic Tiger Cat, and so many varieties of the quadrumanes that their introduction can scarcely have been accidental. In Java, the Rhinoceros, the Royal Tiger, the Wild Ox of the Malayan Peninsula, and several varieties of the smaller quadrumanes, still exist in the jungles. Sumatra and the Peninsula contain every form of mammal found in Java and Borneo, with the addition of the Tapir. These facts would go to prove that Java, Borneo, and Sumatra continued attached to the continent of Asia, at a comparatively recent epoch. The common brown monkey is the only member of the family of quadrumanes that has reached Celebes and Bali, although the strait which separates the latter island from Java is only two miles wide.

We will now trace the range of the marsupialia from Australia towards the continent of Asia. A variety of the Kangaroo (*macropus*), two varieties of the Opossum (*didelphis*), one of which closely resembles the Ring Tailed Opossum of New South Wales (*Phalankista Cookii*), one variety of the *Dasyurus*, the Native Cat of the colonists of New South Wales and Port

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Opossum, have been found in the southwest part of New Guinea; and singularly enough the Kangaroo has adapted himself to the half-crowned nature of the country by inhabiting the trees. A variety of the Kangaroo still exists at Arru Island, which seems to be identical with the small Grey or "Brush" Kangaroo, found in the thickets throughout Australia. This is the "Filander" of Valentyn. The name by which it is known in the Moluccas is "Pilandook." In Ceram, the Ring-tailed Opossum, the Native Cat, the Flying Opossum, and the little Flying Squirrel, all marsupials, and identical in appearance and habits with those which extend throughout Australia, hold undisputed possession of the forest trees. The Ring-tailed Opossum, which is the most numerous, as in New South Wales, is a common pet throughout the Moluccas. The opossum, more especially the Ring-tailed variety which inhabits trees, is the most hardy of Marsupials, that is to say its geographical range is farther extended than that of any other pouched animal. The tree opossum and the native cat (*Dasyurus macrourus*) are the only varieties of this ancient form of mammals that have not retreated before the European quadrupeds that have been introduced into the southern districts of Australia; the mere presence of a flock of sheep, without their usual attendant, the dog, being sufficient to drive the Kangaroos from the "runs." The tree opossums are not liable to be disturbed by any animal less agile than the monkey, as they are never seen on the ground except when thrown out of the trees while fighting, and then they scramble up again as fast as they can. The consequence is that the tree opossums now abound in the settled districts of Australia to an extent that could not have happened previous to the arrival of Europeans, when the aborigines kept down their numbers by dragging them out of their nests in the hollows of trees to serve as food. Even the presence of the monkey is not fatal to the tree-opossum, as is evident from their co-existing in Timor and in parts of South America. The Musang or Mongoose of the western parts of Archipelago, will prove fatal both to the tree-opossum and to the Native cat, whenever he comes to be introduced to Australia, as he can enter the hollows of the trees and destroy them in their nests. The tree-opossums of Australia feed on the leaves and tender shoots of the Eucalyptus. In the Moluccas, where the Eucalyptus is rare, if found at all, the tree opossums feed on the leaves of the Warringin and Lingoa trees, and on the outer bark of the Kamari. As the two first exist in the Malay Peninsula, the latter under the name of Angsannah, the absence of the tree-opossum from this part of the Archipelago cannot be attributed to want of suitable

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in the northern part of the Malay Peninsula, with a view to the discovery of fossil remains of mammals, might be attended with very interesting results, for although the rock has been of subaqueous formation, as evidenced by the existence of fossil shells, still the remains of mammals may be found there, as well as in the caverns of the same formation in Australia. Such an examination is not necessary to shew that marsupials once existed on the continent of Asia, that point having been decided by their appearance in the secondary beds of Europe; still it would be a matter of great interest to science were their remains discovered in the southern parts of Asia.

The Malayan name is "kusu" which has been latinized by the old Dutch naturalists into "Cuscus," and I am sorry to see that this barbarism has been adopted by modern Zoologists. In Timor the Ring-tailed Opossum is common in the Southern parts of the island. The only marsupial that has yet been traced in Celebes is the Flying Opossum, but the Zoology of this island still remains to be explored. The Zoological connection of Java, Sumatra, and Borneo, with the continent of Asia, is as distinct as that of Timor, Ceram, and New Guinea, with the continent of Australia. Probably Celebes will be added to the Australian group, but until its Zoological character is more fully ascertained, it will be safer to allow it to remain neutral ground. The inferences to be drawn from these facts must be self evident.

Those who are acquainted with the process which is still going on in the volcanic bands of our immediate neighbourhood, will be unwilling to entertain the opinion that the subterranean action which has influenced tracts so remote from each other, can have been exerted simultaneously. The only test that I have been able to discover which is likely to prove applicable to the determination of the comparative antiquity of the epochs of upheaval, is that which must be familiar to those who have had "transactions" in gold dust in this part of the world. Proficients in the art of ascertaining the "touch" of specimens of native gold, by the colour that it leaves when rubbed upon a smooth black pebble, assert that the comparative value of gold is determined by its age, which I suppose means the comparative antiquity of the period in which it has been deposited in the alluvium. This test appears rather fanciful, but it is certain that experienced "touchadars" can detect in a moment the difference between Pahang and Borneo gold.

But this is a point of no immediate interest to physical geography, although, if followed up by an assayer, it might be productive of useful results in determining the course and progress of former volcanic currents. It is by no means improbable that recent researches in electricity,

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which have been pursued with such vigour for some years past, may have developed laws which regulate the volcanic currents, although the fact is yet unknown in these remote regions. It is evident that the volcanic band has shewn a determined obstinacy in breaking across the primary ranges, and a tendency to run along the outermost range when it had succeeded. I have already alluded to a volcanic band which extends south from Japan through the Bonin and Mariana or Ladrone Islands. In the absence of any evidence to the contrary, I have long inclined to the opinion, that this band, prolonged through the Carolines to New Ireland and the New Hebrides was the first line of attack, and that spurs extending from the Solomon Group to the neighbourhood of Moreton Bay; and from the New Hebrides through Norfolk and Howe's Island to the coast near Sydney, produced the upheaval of the south eastern part of that continent, and broken through Bass Strait:—that a branch from this line precipitated itself directly on the coast of New Guinea, the minor currents which extend to the northwest extreme of the Gulf of Carpentaria, and along the Timorean area, being a continuation:—and that a second branch broke off from the Ladrone through Egoi, Yap, and the Pellew Islands to Celebes; but an examination of the islands lying between the Ladrone and New Guinea, with the express object of tracing the course of the volcanic band, will be necessary before conclusions can be arrived at. From this point, however, I can proceed with a tangible foundation. The distinct character of the mammalian forms existing in the countries lying on the Great Asiatic Bank, shew that Borneo, Java, and Sumatra, were attached to the continent of Asia by an unsubmerged range at a period long subsequent to the separation of Australia; which would imply that the curved band that passes from Formosa through the Philippines, the Moluccas, Java and Sumatra, is the most recent line of volcanic action.—George Windsor Earl in No. VI Jour. of the Indi. Archipelago and Eastern Asia, May 1882, pages from 244 to 272.

The Indian Archipelago possesses an extraordinary abundance and variety of materials for elucidating the most interesting and the most intricate questions in ethnology. A complete account of the different races by which it is inhabited would furnish results applicable to the investigation of the connection of races in every other region of the world.—No. IV. Oct. 1847. Jour. Ind. Arch. page 171.

In the Archipelago we can never free our researches from Continental elements. The history of the nations along the southern borders of Asia has in every era exercised some influence on the Archipelago, and we may be



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sufficiently impressed with the difficulty and importance of the international influences of the Archipelago itself, when we consider that while some writers have derived Malayan civilization from an original source in Menaangkaban, others have referred it to Java, and others to Celebes, while two of the ablest,—Mr. Marsden and Mr. Crawford,—have busied themselves in endeavouring to exhume a great nation whose civilization preceded the Javanese, the Malayan and the Bugis, and impressed itself more or less not only in the Archipelago but over all Polynesia.—*Ibid.* p. 178.

Mr. Crawford mentions in a letter that he had just completed an essay “on the races and languages of the Archipelago and Pacific Island,” was read to the British Association at its last meeting at Oxford. “The theory of Marsden,” says Mr. Crawford, adopted by Humboldt and others, of one original language prevailing from Madagascar to Easter Island among all the nations not negro, and the identity in race of the brown-complexioned men within the limits in question, is wholly groundless, and a main object of my essay is to refute it. In a dictionary of the Madagascar of 8000 words the number of Malay and Javanese words is only 147;—in one of the New Zealand of 4550 words, 103;—in a French one of the Marquesas and Oman of 3000 words, about 70;—and in a Spanish Dictionary of the Tagala of the Philippines of 9000 words, about 300.—*Ibid.*

(133) AGELIA. A wood of this name, was exhibited at the Madras Exhibition of 1857, and was deemed deserving especial notice being supposed by some to be the Indian Cedar wood “*Aquilaria Agallocha*.” This is a light colored wood with a fine even grain, appears admirably adapted for furniture and many domestic purposes. It is said to be abundant in Malabar and has been already used for a variety of purposes by the Railway Engineers. The jury recommended some further enquiry regarding this tree, the extent to which it is found in Malabar, and whether known in other parts of the country. Madura 1247, Malabar 2737, Mysore 2254.—*M. E.* of 1857.

(134) APOCYNACEÆ. LANCE-WOOD OF MAULMAIN. There is a tree found all over the Provinces which yields a wood that the residents at Maulmain sometimes call lance-wood. The Karens make bows of it, but prefer *Cassia fistula*. Mr. Mason had never met with the tree in flower, but thinks it a species of *dalbergia*, though it may possibly be a *cassia*.—*Mason*.

At another place he says, the tree which produces a timber possessing the properties of lance-wood is not uncommon in the Provinces, but it belongs to the dog-bane tribe, and is not at all

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related to *Guatteria virgata*, the lance-wood of commerce.—*Mason*.

(135) APONOGETON MONOSTACHI-ON, Thunb.

*The root.*

Cottie kalung, TAM.

The plant is commonly found growing in the beds of tanks. Thunberg in his “Travels,” tell us, says Ainslie, that this root is eaten in Caffraria, as a great delicacy: it does not appear to be less relished by the Natives of India.—*Ainslie*, p. 248.

(136) AQUAMARINE. At the Madras Exhibition a good specimen of Aquamarine, or Beryl, was contributed by Lieut. Puckle from Mysore: other samples of long reed like crystals were forwarded by the Nellore Local Committee; small pieces of Amethyst, Tourmaline, Rock crystal, Agate and Cornelian were exhibited from Masulipatam.

(137) AQUATIC BIRDS are largely brought to the markets of the principal towns of India, at certain seasons of the year, ducks, teal &c., and may be procured in abundance.—See WATER FOWL. C. of I.

(138) ARACHIS HYPOGEA, Lin.

*The Nut.*

Vayr Cadalay, TAM.  
Velaitie Moong, DUK.  
Naylasanizheloo, TEL.  
Cachang goring, SUMA.

Moong phullie, MAHRATTA,  
Manilla gram or ground nut.  
Boochanaka, SANS.

It is generally toasted before it is eaten and is extremely palatable.—*Ainslie*, p. 234.

*The Oil.*

Vayr-cuddala-yennai,  
TAM.  
Manilla noona, TEL.

Willayetie-moong-kie phullie-ka-tael, HIND.  
Ehoysing ka tael, HIND.

This valuable oil, which of late years has been exported to a large amount, is obtained by expression from the seeds of the Ground or Manilla nut, which is now cultivated to a considerable extent in most parts of the Peninsula of India.

In the year 1848-49—37,000 gallons were shipped, but in the two following years the Exports exceeded 1,00,000 gallons. It has however fallen to 57,207 gallons in 1852-53.

It does not seem to be consumed to any large extent in this country, although the nut itself is much eaten by the poorer classes. It is said to be used for adulterating gingely oil in North Arcot, where it costs from Rs. 1-8-0, to 2-12-0, per maund. In the Nellore District, the seeds are procurable at Rs. 1-8-0, per maund and in Tanjore about 200 acres are cultivated, producing annually 75 candies of oil at Rs. 2-6-0 per maund.

The seeds yield about 43 per cent. of a clear straw coloured edible oil, which is an excellent substitute for olive oil, and makes a good soap.

## ARTOCARPUS INTEGRIFOLIA.

Its value in London in January 1855 was £17-10 per ton.—*M. E. J. R.*

(139) *ARALIA PAPYRIFERA*. The source of the product known as Rice Paper continued long a matter of doubt, but it is now equally certain that it is produced from the *Aralia papyrifera*.—See *Paper-Rice and Rice Paper*. C. of I.

(140) *ARASA NAR. FICUS RELIGIOSA*.

(141) *ARTABOTRYS, R. B. POLYANDRIA-POLYGINIA*.

Artao, to suspend, botrys, a bunch, the peduncle has a curious hook, which lays hold on any support near and assists in bearing up the clusters of fruit.—*Gr. Cat. p. 3 and 4.*

(142) *ARTABOTRYS ODORATISSIMUS*. W. and A. 33.

*Uvaria Odoratissima*, Rox. Flor. 2. p. 666.

*U. Uficata*, Rox. Flor. 2. p. 666.

*Modira Walli*, Rheed. Mal. 7. t. 12, usually referred to is perhaps the *Ancistrocladus Heynianus*.

A scandent shrub with shining leaves, and very sweet smelling flowers.

In gardens Bombay, as an ornamental plant.—*Gr. Cat. p. 4.*

The flowers of the *Artabotrys odoratissimus* and *Unoua odorata* are extensively cultivated in China for their perfume.—*Williams*.

(143) *ARTOCARPUS INTEGRIFOLIA*. JACK.

### The Tree.

Pilla Maram, TAM.	Hansa Vriksha, CAN.
Panasa Chettoo, TEL.	Kantal, BENG.

Mr. Rohde says this tree is cultivated in every part of Southern India. On the Malabar Coast, it attains to great size, the wood is very like Mahogany but splits in hot dry stations; from the juice of the uneatable parts of the fruits and tender parts of the tree, a good bird lime is prepared. The kernels of the seed toasted are nearly as good as chestnuts, the fruit is also used by Europeans soaked in salt and water.—*Rohde, M. S. S.*

### The Fruit.

Peela pullum, TAM.	Chopada, SEMATRAN.
Punnus, DUK.	Boon Nanea, MALAY. JACK.
Panasa pundoo, TEL.	Panasa, SANS.
Tsjacka, MAL.	

This fruit is not relished by some people owing to a peculiar strong smell that it has: others are extremely partial to it from its luscious sweetness. Aghastier, in his work on diet, says that it is apt to increase the secretion of bile, and if frequently eaten, will produce dyspepsia. The fruit of it sometimes grows from that part of the trunk which is underground and by its growth bursts the soil and discovers itself. These are always accounted to be the best.—*Ainslie, p. 230.*

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(144) *ARGEMONE MEXICANA* BRUMADUNDOO OR COOROOKOO OIL.

### The Oil.

Brumadundoo yennai, TAM.	Oil of Prickly Poppy, or
Ernamundie Nootia, TEL.	Jamaica yellow thistle,
Parangie datura ka tel, HIND.	Eng.

This pale yellow, limped oil, may be obtained in large quantities from the round corrugated seeds of the prickly poppy, which was originally introduced from Mexico in ballast, but now flourishes luxuriantly in all parts of India. It was noticed under the head of *Argemone mexicana*. It is sometimes expressed by the natives and used in lamps, but is doubtless adapted to other and more important uses. In North Arcot it costs from Rs. 1-14-0 to Rs. 2-1-0 per maund.—*Madras Exhibition of 1855.*

(145) *AROMATIC ROOTS*. There are several kinds of aromatic roots found in Malabar, the products of various species of *Curcuma*, *Zingiber*, *Costus*, *Kempferia* &c. M. C. C.

(146) *ARTIES* in Madras, timber of various sizes 12 to 18 feet long and from 1 to 1½ feet in breadth.

(147) *ARSENIC, WHITE OXIDE OF, Eng.*

Warangan patih, MALAY.

(148) *ARSENIC, SULPHURET OF, or ORPIMENT.*

Warangan or Burangan, MALAY.

Dr. Helfer reported the existence of ore of arsenic on the Mergui Islands, Mr. Piddington found it in the antimony ores, and Professor Mitchell also found arsenic in the lead ore that he analyzed.—*Mason*.

In China the sulphuret of arsenic is sometimes cut into ornamental figures in the same manner as prehnite and agalmatolite.—*Williams, p. 248.*

(149) *ARRACK*.

Charayum, TAM.	Khulloo TEL.
Arruk, Arab. HIND. and	Arrack appee, MALAY.
DUK.	Arrack, ARRACAN.

*Ainslie's Mat. Med. p. 140, 268.*

(150) *ARSENIC. RED ORPIMENT, REALGAR.*

Kudireipat Pashanum, TAM. | Mansil, HIND.

Mr. Elphinstone mentions orpiment being found at Bulkh in Cabul. The yellow orpiment is an article of trade from China and Burmah where the red is also procured and from Japan. The red is common in the Bazaars, a coarse description, "manocilla" Tam, "ustarkhy" Arab, is frequently exposed for sale in the bazars and is used only as a pigment.—*Rohde, M. S. S.*

(151) *ARGYREIA SPECIOSA* SAMOODRA PALACCA.

(152) *ARTS AND MANUFACTURES*. The Bombay Committee for the collection of



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specimens for the Great Exhibition of 1851 resolved to enhance the value of their collection by accompanying it with as large an amount of statistical and descriptive information as they could procure: and the written portion is not unlikely in this case to be one of the most valuable of the results of their labours. The difficulty in breaking ground in such matters as these, is to secure anything like an approach to accuracy at the outset—If we wait for even an approximation to perfection we shall never be able to make a beginning; and the great thing is to strive to give an outline at all events—anything is better than nothing,—correcting and filling in as we advance. It has, under these circumstances, occurred to us that we might do some service to the state, and impart some instruction and some amusement to our readers, by attempting to give the outpourings of a promiscuous and tolerably well-filled notebook, in the shape of a series of notices of native art and manufacture as they prevail at Bombay,—confident that, imperfect as on many occasions our information will be found, it will not prove wholly uninteresting to our readers, and convinced that there are many amongst them who will readily fill up what is wanting, and correct what is wrong, who would scarcely take the trouble of drawing up a paper or notice on the matter to be described. Our first concern is of course to enlighten or to please our readers; but if in doing this we shall be able to assist the Committee in any way, the gratification we shall derive from our efforts will be doubled. We shall endeavour mainly to address ourselves to the processes which are new or have not hitherto been described in books: when we find descriptions scattered through several works, or others which furnish an imperfect account of the matter, we shall abridge or extract, as may seem most meet, as we advance. We shall commence with an attempt to describe Turning, as practised by the natives:

(153) *The Turning-Lathe of India.*—There are few implements more generally known, more simple or efficient, or better suited for native habits, where the workman always sits on his hams by preference if this is possible, than the Native Turning-Lathe. The simplest form of the lathe consists of two pegs or pieces of wood driven into the ground, with a short iron peg projecting from each inwardly; these constitute the centres. When the centres get slack, the pegs, or heads of the lathe as they would be called, are driven a little firmer and further in: or should this not suffice, the pegs are pulled up and driven into fresh ground. The rest consists of a cross piece of wood with a handle like a wooden mattock or coal-rake. This is placed in front of the lathe and steadied by the foot. The work to be turned is spun backwards

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and forwards by a bow held in the right hand: the tool is managed with great dexterity by the left hand and foot, the rest being steadied by the right foot. The native workman is almost literally quadrumanous, and can make his feet and toes almost as serviceable as his hands and fingers. The lathe costs about Rs. 2, and a native workman will turn out on this as much rough work as an Englishman will on the best foot-lathe. The tools mainly consist of short bars of steel sharpened at both ends, each end being used alternately; an old file, or anything else that will cut. They have seldom a good edge—they are set on a fineish-grained sandstone, not capable of making them very sharp.

A better variety of lathe has the two heads coupled together by a bar, and made fast by wedges: the other arrangements are the same in both. From these two, bed-posts and pieces of wood from a quarter of an inch to eight inches in diameter are turned out. Instead of being painted, the works are lacquered on the lathe by holding on a piece of resin coloured with some mineral paint. They give in this way, at a most insignificant price, the effect of highly polished varnished work. The lathe with one centre and chucks for turning hollow cups and fancy work, is a much more perfect and highly finished implement than the lathes of two centres. It consists of a strong platform of wood, from two to three and a half inches thick, and one by one and a half or two feet square. The heads are morticed into this: an iron post secures the spindle end—the other works with a wooden collar and washer. The chuck is fastened on without screwing. Like the other lathes, it is worked with a bow, but the bow itself in this case is a neat and well finished implement. The tools and mode of working are the same, or nearly so, in all. In this lathe, the most beautiful ebony and ivory work is turned with singular neatness and speed; and we should say a native would beat any European with this variety of implement. It is astonishing to see with what celerity they turn off beads, spheres, balls, boxes, backgammon men, and plain chessmen,—for each of which half a dozen of turns seem to suffice.

(154) *Fish Oils of India.*—The manufacture of Fish Oil is practised all along the western coast: we are not in possession of any trustworthy account of the amount or of the value of the manufacture. The extreme cheapness of cocoanut, castor, and other vegetable oils, interferes with the productiveness of animal oils. The great source of supply is the shark and the skate: the livers of these are cut out, and thrown into a vat or old canoe, or other receptacle, and trodden on with the feet till the oil is expressed. It is then drawn off, and stowed away: boiling does not seem to be resorted to, as there is little or no muscular fibre, such as that of the blubber.

ber, to be got rid of, or aqueous particles to be dispelled. The amount of oil manufactured at each fishing-village will, in all likelihood be found very nearly proportioned to the value of the trade in sharks' fins. The oil from the variety of skate called "Wagil" by the natives, seems to have a strong resemblance to the cod liver oil now so much in demand for medicinal uses. On the Malabar Coast, especially off Vingorla, the seas literally swarm with a variety of the sardine: a coarse ill-smelled variety of oil, which sells for from six to twelve annas a maund, is manufactured from these—the natives employ it for smearing their boats. This is all the information we at present possess on the subject: we give it, meagre as it is, in hopes that we may be enabled speedily to encrease it.

(155) *Salt*.—One of the most extensive manufactures on the western shores is that of Sea Salt, and, simple as the process seems, it is far from devoid of ingenuity or interest. Amongst the numerous islands which fringe the Malabar Coast, there are countless narrow, creeks and inlets, left dry at low tide, the expanse of mud then exposed being often enormous. Off the shores of Sewree the tide at springs retires nearly two miles: and this is nothing at all out of the way in the neighbourhood. When salt-pans are proposed to be established, the first thing is to construct a mud embankment,—a foundation for it being selected where the water is never more than four or five feet deep. The crest of the embankment is made to surmount this by two or three feet—the base of it is generally from two to three times its height. Openings are purposely left at intervals in the principal embankment, and from these, at right angles to the main line of the wall, other embankments are run inland, parallel to each other, leaving a current between large enough to admit of a line of salt boats running up. Immediately behind the embankments the salt-pans are laid down. These consist of rectangular compartments, from twenty to thirty feet across, and commonly twice as long as they are broad, and from a foot to a foot and a half in depth. They are separated from each other by little mud walls, about three feet across at bottom, and two at top, more or less, according as little channels for filling the pans are meant to be run along them or not. Two, three, or four, lines of pans, according to the extent of the back water, are carried along the rear of each embankment—care being taken to leave an area of land capable of being flooded by the sea betwixt the pans and the mainland, three or four times the size of the pans themselves. So soon as the monsoon is fairly over, all the fresh water that has accumulated in the pans or back water is run off, and in November or December the sea is admitted to the back water through a sluice

in the embankment. The pans are now carefully cleaned out, their floors and walls being made smooth and nice. In about a month after it has been admitted to the back water, the sea-water, now getting reduced in quantity, and encreased in saltiness by evaporation, is let into the pans. The first charge requires about six weeks to evaporate: subsequent charges are dried up in half the time of the first, thus diminishing as the season becomes hotter, and the brine more strong. The strength of the brine is judged of by its becoming red: in fact, a curious variety of creature, of the volvox kind, which seems never happy unless in a pickle—the same as is to be found in a fossil state in the Punjaub rock-salt, and which often tinges the waters of our seashores as if stained with blood,—makes its appearance just as the salt is ready to crystallize,—often tinting the salt itself of a fine pinkish hue. When very nearly dry, the salt, which has now accumulated to the thickness of an inch or two, is raked off, the upper portion, which is beautifully white, and almost quite pure, being first taken,—the lower portion, often crystallised in pieces of half an inch cube, is taken up next,—is slightly mixed with clay, and is that generally in use. The white and bluish salt are now piled up separately in conical heaps, about sixteen feet in diameter, and ten feet high, which are preserved with a thick thatching of grass during the monsoon. The white salt is as pure as any in the world—the black salt is mixed with about one or two per cent of clay. Both are in a great measure free of the magnesian salts and sulphates which contaminate pan-made salts at home;—everything more soluble than muriate of soda remaining behind in solution, is washed away by the rains. Salt-pans are much less efficient when new than afterwards, and they continue to improve as the ground becomes impregnated for ten or fifteen years. When the first crystallisation is unsatisfactory, as it often is, a second charge of brine is let on before the salt from the first is removed. The evaporation in the back water goes on, of course, as rapidly as in the pans themselves, and by this contrivance, which requires no care or preparation, an amount of evaporating surface three or four times that of the pans is secured: the pans themselves only require trouble or attention, the back-water require none. The pans are drawn from three to four times every year: as the rains approach, they are abandoned for the season. The sea is seldom let in more than once or twice into the back water: were the whole available surface kept covered, double the amount of salt at present manufactured might be made. The supply, however, is so close on the heels of the demand, and the profits are so very low, that there is no reason why production should be extended. Such is the convenience of our shores



for the manufacture, and so easily and so cheaply can the process of storing and carrying away be managed, that all the attempts made by Baniyas to bring salt from Scinde, where it is to be had in unlimited quantity ready made, have proved unremunerative. The idea, therefore, of importing salt from England into India is about as chimerical as any that ever entered the human imagination; while the abuse heaped on the quality of the salt used in India is as unreserved as may be. The upper salt is scarcely surpassed in purity by the finest the Cheshire mines send forth: while the black salt contains as much of the pure muriate of soda as does the common pan-made salt at home. The matter which contaminates the former is conspicuous, and looks very dirty, but then it is perfectly harmless: the subtle contaminants of the latter are eminently mischievous, though invisible. An English adult is supposed to consume at an average of from fifteen to twenty pounds of salt annually, so that he will in this way swallow some three ounces of mud a year: it will be a long time before the peck of dirt every one is said to have destined for him in the course of his lifetime, be at this rate consumed: in India, numbers of people eat pounds' weight of clay by choice! See SALT SUP. C. of I.

(156) *Cements*.—The instructions sent from home for the guidance of the Indian committees for procuring materials for the Exhibition of 1851, required amongst other things an account of cements and building stones. Our only cement here is chunam in its various forms: the only building stones, which differ materially from those of the rest of the world, are laterite, concrete and kunkur; and of each of these a short notice may interest the reader.

It is remarked by Humboldt, that however widely the aspects of Nature may differ from each other in other respects in various quarters of the world, we find the great geological formation, everywhere very nearly the same—the same rocks, bearing the same appearances, constituting the leading features of the landscape throughout. The remark, so far as India is concerned, must be received with modifications, and two of the varieties of rock we have named, if not all the three, are either unknown in the other quarters of the world, or have not hitherto been described by geologists. The names of laterite and kunkur are not to be found in the indices of our most recent manuals. Kunkur is described as a variety of limestone mostly nodular—always fresh water and recent,—in most cases in the act of being formed under our eyes. The following list of papers on the subject—which may, so far as we know, be very incomplete—shows that there is no want of pub-

lished information in reference to Kunkur did European geologists choose to seek for it:—

Colonel Sykes on Kunkur. London Geological Transactions.—Prinsep's Analysis of. Ibid.—Newbold's account of, Bengal Asiatic Transactions, 1844. Vol. XIII., p. 317. Old or travertine variety from specimens used—same as that around Rome. Ibid.—Formation now in progress same as calcareous formations on shores of Red Sea. Ibid.—Newbold's Geology of Southern India. London Asiatic Transactions, 1845. Calcutta Review, 1843.—Captain Abbott's account of—as prevailing in upper Bengal—sheet kunkur, nodular kunkur, fragmentary kunkur. Bengal Asiatic Transactions, Vol. XIV., Part I, 1845, page 443. Theory of Formation Ibid, p. 444.—Soda Soils reposing on beds of, near Barramahal, Captain Campbell's account of. Bombay Geographical Transactions, 1840-44, Vol. III., page 165.

It is sometimes found in thick stratified beds like the travertine near Rome, and seems in this case to have been formed by calcareous springs: more generally it is met with in clay or alluvial soil, in the shape of small pieces from the size of pease or filberts to that of the hand. In the blue clay which stretches along all our shores, it is found in vast abundance, generally assuming the most fantastic forms—indeed it abounds in every rice-field and open soil all over the country. The more recent varieties seem to be formed by the agency of the rains: when the earth abounds with vegetation, the tepid waters are charged with fixed air and dissolve the lime prevailing in the soil everywhere around,—the mineral being again thrown down as the advancing season dispels the excess of gas. It in this state absorbs the clayey matter around, and cements it into kunkur. This is collected by the lime-burner, placed with firewood in small-sized conical kilns, and burnt in the usual way. It contains 72 of carbonate of lime, 15 of sand, and 11 of clay and oxide of iron. Mixed with half its weight of river sand, it makes an excellent mortar: burnt in pieces of a cubic inch or so in size, and then powdered without slaking, it forms a first rate water cement, setting in a few minutes, and becoming as hard as stone. At Poona the finer varieties of kunkur are burnt with charcoal all throughout the city, in neat pigmy looking kilns 2½ feet high and about as much in diameter at the base. These hold about a cubic foot of material, or about 30lbs. of charcoal and kunkur in equal parts. When burnt, it is slaked and then made up into bricks, which are sold in the bazaar for the purpose of whitewashing. The finer kinds of chunam on the coast are made from shells, brought chiefly from Rutnagherry. The process of burning is a peculiar one—the operation may be seen in progress all along the shores of Salsette and Trom-

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bay. A piece of ground about ten feet square is laid down even and floored over with clay: an upright pole is placed at each end of this, and a sheet stretched out with back stays spread between the poles, which are steadied with strings. On the floor a bed of shells and rice-chaff alternately, about ten inches thick and eight feet by six, is spread neatly out. Some firewood is placed along the windward side of this, and when the sea-breeze sets in the wood is kindled. As the heat extends to leeward, and the shells become calcined, the limeburners draw off the fore part of them with a stick, and so soon as they have cooled on the floor sufficiently to allow them to be handled, they are placed in a scoop basket and the dirt and epidermis winnowed from them. The shells, now white and pearly, are next thrown into a small sized vat partially filled with water: here they for some time boil from the effects of the heat and slaking. The whole in a short time settles down into a fine semi-fluid mass, which is taken out and slightly dried, and is now ready for use. For the modes of manipulation by which such beautiful effects are produced at Madras, See CEMENT, C. of I.

(157) *Building Stones*.—To pass from cements to building-stones—we first come to Laterite. And should any of our readers feel desirous of more enlightenment than they possess in reference to this most singular formation, they will find it in abundance in the papers the titles of which are subjoined. Dr. Cole, in the introduction to one of the ablest of these, remarks as follows: “In the volume of reports for 1831–32 of the British Association for the advance of Science occurs the following passage in the report on Geology by the Revd. W. D. Conybeare:—‘We learn that primitive formations in which granite bears the principal proportion, occupy not only the Great Himalayan northern chain but also three fourths of the entire peninsula, from the vale of the Ganges below Patna to Cape Comorin: although these rocks are frequently covered with a thin crust of laterite, a ferruginous clay which is connected with the trap formation.’ Now that so little should be known concerning laterite, a mineral so extensively diffused; and offering so peculiar a feature in Indian geology, constitutes an opprobrium to the science, which it is desirable to efface.”—*Madras Literary Transactions*, 1836, Vol. III. The English geologist seems just as ignorant and heedless of laterite now as he was twenty years since: and in India, though we possess an enormous body of information regarding it, we are still undetermined as to what it is—whether it be a sedimentary rock, the efflux of mud volcanoes, or decayed trap re-integrated into rock.—List of Papers published on Laterite:—

Found in boulders or detached masses on Bombay, Salsette, Elephanta, and Trombay—

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in blue clay, at Sewree. Dr. Buist on, Bombay Asiatic Transactions, 1850.—In borings at Calcutta, Bengal. Asiatic Transactions, 1837. Madras Literary Transactions, Vol. VII p., 477.—Lignite found in, by Captain Newbold, Dr. Balfour on, Bengal Asiatic Transactions, Vols. XIII. and XXXIV.

A very good summary of the whole question will be found in the *Calcutta Review* for 1848, Vol. IX. page 314. This rock, as already stated, seems peculiar to India. It covers the western coast almost continuously, and for the most part up to the very foot of the ghats, and from close by Bombay to Ceylon. It is found in detached beds along the Coromandel coast, near Madras and Nellore, Rajahmundry, and Samulcottah, extending into Cuttack. It caps the loftiest summits of the eastern and western ghats, and some of the isolated peaks in the table land in the interior. It occurs in the Southern Mahratta Country, Mysore, Salem, Coimbatore, South Arcot, the Carnatic, and Tanjore: it is found in Malwa, and in many parts of Bengal and Ceylon. It fringes the shores of Burmah, Malacca, and Siam, and appears on the coast of Sumatra. It is found in boulders and rolled masses all along the Malabar Coast from Bombay north to Gogo in the Gulf of Cambay, beyond the region of the formation itself. Pieces of it have been met with three hundred feet under the surface, in the blue clay-beds at Calcutta, as also in similar beds of lesser thickness in Bombay, and close by Cambay and Kurrachee: so that the formation at one time was probably much more extensive than at present. Its colour is of a red iron or brickdust hue, sometimes deepening into dark red. It is marked with whitish stains, and is occasionally cellular or perforated with tubiform holes. It rarely if ever contains either crystals or organic remains, is never stratified or columnar, and generally spreads out in vast sheets on the surface of the plutonic or volcanic rocks. When the upper surface is cleared away, the rock below is found soft and easily cut into blocks of any form. It quickly hardens and darkens in hue by exposure to the air, and is not at all liable to decomposition or injury from the weather. The Arcade Inquisition at Goa is built of it, and also the old fortress of Malacca. Newbold.—*Asiatic Transactions*. A curious variety of trap-tuffa, sometimes white sometimes greenish or purple, found in Bombay and many other parts of India, resembles laterite in the quality of being easily cut when raised, afterwards hardening on exposure to the air. It is used as a building-stone, and suits well for basins, troughs, and aqueducts: it is not very extensively employed.

*Littoral-concrete* is a variety of rocks which has not hitherto found a specific place in our



geological catalogues:—the name has been conferred on it from its being invariably found close by the seashore, and from its resemblance to the artificial stone formed by the cementation of sand, gravel, or other coarse material, by lime-water or mortar. It is composed of the material prevailing on our shores—of shells, sand, gravel, and pebbles, and varies in its character with the rocks in the neighbourhood,—being micaceous towards Cochin and Tellicherry, from the quantity of sand and other nodules from the granite and gneiss, gravelly to the north of Bombay, and around us composed almost entirely of fragments of shells. (Sir Erskine Perry states that this strange variety of rock is to be found all along the Himalayas, and prevails extensively in Southern India. We have not observed it mentioned by any of our geologists, but have no doubt of the correctness of the statement of the Chief Justice.) It is to be met with only in the regions where rains abound. Along the shores of Scinde, Arabia, and the Red Sea, though the material composing it is abundant in a position similar to that in which it exists on the Malabar Coast, it is nowhere cemented into stone. Even here, indeed, the cementation is far from invariable: in one part of the esplanade we have loose sand at the surface, and concrete beneath: at another, sand or concrete as the case may be, from the surface throughout to the rock: and in a recent excavation, concrete was found for the first twenty feet, resting on a bed of fine sand perfectly loose. It is frequently found to rest—as, for example, at Sewree and Mahim—on a bed of blue clay filled with kunkur and mangrove roots, offering evidence of a depression from the time the mangroves grew at high-water mark, so as to permit the gravel deposit to accumulate. The whole must then have been raised by a second upheaval to its present level. Our principal quarries of these are at Versova, about twenty miles to the north, where the shore is sheltered by a vast dyke of basalt formerly submerged.

The sand, which seldom extends more than few inches down, is first removed, and the rock is smoothed on the surface. A space about twelve feet each way is next divided into slabs one foot square,—the grooves between them being cut with a light flat-pointed single bladed pick. These are raised successively by a tool something between an adze and a mattock, a single stroke of which is in general sufficient for the detachment of each from its bed. The blocks thus cut out and raised being thrown aside, the bed is once more smoothed, and the operation resumed till the pit reaches the depth of six or eight feet, when, it being no longer convenient to remove the stones by hand or basket, a new pit is cut. This variety of building material is brought in vast quantities to Bombay where a

large portion of the native houses are built of it. It is not very strong, but with the admirable cement employed with such lavish hand, it makes a good and economical wall.

We must not conclude this without noticing the native sledgehammer employed in breaking trap, granite, limestone, and the other numberless varieties of rock,—and one of the most efficient tools—that can be made use of. Its handle is generally of male bamboo about two feet long: its head is something like that of an ill-shapen axe—thick all along. It weighs about eighteen pounds. In the face or striking portion is a bluntish wedge of steel, fastened in with a piece of leather. With this the native quarryman will break up the most obdurate trap into slabs or blocks of almost any size or form, from a pavement flag three inches thick and two feet square, to a block two feet cube. He looks narrowly at the grain of the stone, and then with a series of blows, of no great force apparently, literally cleaves the stone, which falls in pieces apparently without effort. Similar varieties of this, of exactly the same pattern, are used as hand-hammers—they are called Sootkees.

The blasting, or rather the boring tool, or jumper, is a plain round rod of iron, about three feet long, pointed at both ends with steel. No hammer is ever employed in boring: the jumper is raised and struck in with both hands, and a man will penetrate some inch or two in an hour. Stones are usually paid for to the quarry owners at so much for each jumper at work.

The native punch is a short dumpy lancet pointed tool—it is sharpened by being turned point up, and struck with a piece of flint. When used in stone-dressing, it is held in the left hand, and struck with a hollow-faced iron hammer, the cavity being about an inch in depth and as much in diameter.

There is but little to boast of at Bombay in architecture in any way: in the Deccan the most massy structures are raised, and carved from trap, with a delicacy and correctness quite astonishing. The vaults and domes of tombs and temples are commonly bolted with iron from top to bottom, and in many cases, instead of scaffolding, the structure is surrounded with a rough wall ten or twenty feet off, the interval between being filled up with earth: a long inclined plane serves for raising the stones. A magnificent structure of this sort, the tomb of one of the Gwalior princes, has stood half finished near Poona for some thirty years; and here native architecture may be seen in perfection in all stages of advancement. The only building materials at the Bombay presidency, beside that already described, consist of greenstone, trap, and a fine grained variety of nummulite like Bath oolite,—called, from the name of the place whence it comes, Porebunder stone.

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(158) *Lapidary Operations.*—We now come, by natural transition, from stone-cutting on a large to that on a small scale—from the operations of the architect to those of the lapidary. And here we must begin with an account of the gems most abundant and familiar—the agates, onyxes, cornelians, and bloodstones, of the Raj-Peepla range, and Cambay cornelians as they are called from the place where they are mostly cut, and from which they are almost wholly brought to Bombay.

The cornelian in the Raj Peepla range is found in a bed of blue clay—the detritus, probably, of the adjoining rocks. Shafts are pierced in this to the depth of from thirty to thirty-five feet, and horizontal galleries run in any direction that suits the fancy of the miner: they are distributed promiscuously, and do not appear to lie in veins or loads. The galleries seldom exceed a hundred yards in length,—they often run into those of other mines: they are generally five feet in height, and four across. To each mine there are thirteen men attached—they work by turns. Each man must send up so many basketful of earth and stones before he is relieved. The stones are collected in baskets and drawn up by a rope run over roller or pulley. A group of people await them at the mouth of the shaft, and examine them one after another by chipping each on a piece of stone: the compact and fine-grained are the best, and the blacker the hue is at first the redder it becomes after being burnt. There were in 1832 about one thousand miners employed; and each man carried home with him a basket of stones every evening. They were spread out on the ground, and for a whole year turned over every four or five days to the sun: the longer they are exposed the richer become their tints. In the month of May they are burnt. The operation is effected by placing the stones in black earthen pots or chatties. The pots are placed mouth under, a hole being pierced in the bottom of each; over this is put a piece of broken pot. The pots are arranged in single rows: sheep's dung is the only fuel found to answer: the fire is always lighted at sunset and allowed to burn till sunrise. If any white spots appear on the surface of the pot, the burning is reckoned incomplete, and the fire, continued some time longer. On being removed the stones that have flaws are thrown aside as useless: those not sufficiently burnt are kept for next year's burning, and the remainder are sold for exportation.

Nearly the whole of the stones are cut at Cambay—the greater part of them are made into beads. The following is the process: the stones are first broken up into pieces of suitable size for the end they are desired to serve. An iron spike is stuck into the ground, point upwards: the stone is placed on this and chipped with a hammer till nearly rounded: it is then passed on to the

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polisher, who seizes it in a pair of wooden clamps and rubs it against a piece of sandstone placed in an inclined plane before him, turning it round from time to time till it assumes a globular form. It is then passed on to the borer and polisher: a hole is drilled in it with diamond dust, and the beads are finally polished by being put in a bag with some fine emery and rubbed against each other. Thus far on Cambay stones we have mainly abridged from an excellent Paper by Captain Fulljames, in the *Transactions* of the Bombay Geographical Society for 1839. The stones for other uses are sawn or ground down: and this brings us to the native lapidary's tools, which are simple and efficient to a degree. The wheel consists of a strong wooden platform sixteen inches by six, and three inches thick. In this are two strong wooden uprights. Between these is a wooden roller eight inches long and three in diameter, fastened into a head at the one end. This works on an iron spindle or axle at each end. On the one end the axle is screwed and fitted with a nut, by which the saw or grinding wheel can be made fast. The saw consists of a thin plate of iron,—the cutting material consisting of native emery or ground corundum—*koorund* as it is called. The lap wheels consist of two circular discs or cakes of lac with ground *koorund*, coarse or fine according to the work—of a copper disc for polishing, and a wooden one for finishing the work. These are spun backwards and forwards by a bow, the string of which passes round the roller. The lapidary sits on his hams, steadying the wheel with his foot and holding on the stone with his left hand while he works the bow with his right. For very fine work a small sized wheel similar to the English lapidary's wheel, but of smaller size, is used. It is driven by a multiplying wheel, strap and pulley.

The following from the Custom house returns, gives the value of the traffic in Cambay stones, which average betwixt £10,000 and £12,000 annually,—one per cent of the stones finding their way to Europe.

Cornelians—exports of—value:—		
	1844,	1845.
China.....	Ra. 73,423	Rs 52,653
Singapore.....	5,352	645
Arabian Gulf.....	935	18,197
Suez.....	—	40
Persian Gulf.....	2,269	1,257
Calcutta.....	4,179	4,913
Coromandel Coast.....	—	315
Malabar & Canara.....	89	—
Ceylon.....	2536	1540
Great Britain.....	100	216
Cutch.....	—	28
Kurrachee.....	—	35
Goa &c.....	53	—
Concan.....	1,062	—
Guzerat.....	8,460	2,000
Total Rs.	93,478	88,849



The chief articles into which they are wrought are paper-weights, knife-handles, miniature-sized cups and saucers, tablets for snuff-boxes, sets of brooches, necklaces, and bracelets, pins, buttons, and studs. A field gun, with all its appointments, is one of the finest ornamental pieces of Cambay stone work—they sell for from Rs. 40 to Rs. 50. The polish of Cambay stones is not such as pleases the eye of the English lapidary—yet were they sent home in their roughly finished state, they are so cheap that they might be expected to become a considerable article of commerce. They might be built up into mosaics for work tables, into chess-boards, and other elegant articles of furniture—the chief part of the work being performed here, where labour is cheap, the final finish being given at home. The Cambay agates equal the finest “Scottish Pebbles” in beauty; they generally exceed them in size, and may be had for a mere fraction of the price.

Necklaces, Black and Green, from.....	Rs.	7 to 9	each.
Ditto Red.....	„	2 „ 9	„
Paper Cutters.....	„	2 „ 5	„
Knife Handles per dozen.....	„	10 „ 15	„
Stones for Brooches.....	„	1 „ 2	„
Snuff Boxes.....	„	4 „ 15	„
Cups and Saucers.....	„	12 „ 15	„
Pen Handles.....	„	1 „ 2	„
Studs of all sorts, per dozen.....	„	1 „ 2	„
Trowsers Buttons, per pair.....	„	1 „ 2	„
Coat.....Ditto.....ditto.....	„	12as. 1	„
Bracelet Beads, of all sorts.....	„	12as. 1	each.
Paper Weights.....	„	½ „ 5	„
Tables of Sizes.....	„	15 „ 50	„
Guns.....Do.....	„	35 „ 85	„
Earrings per pair.....	„	1 „ 5	„
Finger Rings.....	„	8as. 1½	each.

(159) *Shark-fishing at Kurrachee.*—There are twelve large boats, with crews of twelve men each, constantly employed in the Shark-fishery at Kurrachee. The value of the fins sent to Bombay varies from Rs. 13,000 to Rs. 18,000 a year. Of this a portion only passes directly into the hands of the fishermen, each boat earning perhaps Rs. 1000 annually, or Rs. 100 for each man. From this falls to be deducted the cost of material and other charges. Shark-fins sell in China at about \$32 per picul, or £6 per cwt. In the market of Macassar the ordinary price is from \$15 to \$16, or from £2-10s. to £3 per cwt. It is a singular fact, that this curious branch of trade, which was noticed by Dr. Royle (on the Production of Isinglass.—London, 1842,) in 1842, should, as stated by that gentleman, afford on some occasions to Bombay alone as much as four lacs of rupees—£40,000—taking fish-maws and shark-fins together,—and furnish the chief means of support to at least three thousand fishermen or, including their families, to probably not less than fifteen thousand human beings. One boat will sometimes capture at a draught as many as a hundred sharks of different sizes: sometimes they will be a week, sometimes a month, with-

out securing a single fish. The fishermen are very averse to revealing the amount of their captures: enquiries of this sort are supposed by them to be made exclusively for the purpose of taxation. The great basking shark, or mhor, is always harpooned: it is found floating or asleep near the surface of the water, and is then struck with a harpoon eight feet long. The fish once struck is allowed to run till tired, and is then pulled in and beat with clubs till stunned. A large hook is now hooked into its eyes or nostrils, or wherever it can be got most easily attached,—and by this the shark is towed inshore: several boats are requisite for towing. The mhor is often forty, sometimes sixty, feet in length; the mouth is occasionally four feet wide. All other varieties of shark are caught in nets in something like the way in which herrings are caught at home. The net is made of strong English whipcord, the mesh about six inches: they are generally six feet wide, and from six to eight hundred fathoms, or from three quarters to nearly a mile, in length. On the one side are floats of wood, about four feet in length, at intervals of six feet; on the other, pieces of stone. The nets are sunk in deep water from eighty to one hundred and fifty feet, well out at sea: they are put in one day and taken out the next, so that they are down two or three times a week, according to the state of the weather and success of the fishing. The lesser sharks are occasionally found dead,—the larger ones much exhausted. On being taken home, the fins are cut off and dried on the sands in the sun: the flesh is cut up in long stripes and salted for food, and the liver is taken out and crushed down for oil. The head, backbone, and entrails, are left on the shore to rot, or thrown into the sea, where numberless little sharks are generally on the watch to eat up the remains of their kindred. The fishermen themselves are only concerned in the capture of the sharks: so soon as they are landed they are purchased by Banians, on whose account all the other operations are performed. The Banians collect them in large quantities, and transmit them to agents in Bombay, by whom they are sold for shipment to China. Not only are the fins of all the ordinary varieties of shark prepared for the market, but those also of the saw-fish, of the cat-fish, and of some varieties of ray or skate—the latter, indeed, merges almost insensibly into the form of the shark. The cat-fish, known here by the same name as at home, has a head very like that of its European congener, from which it differs in all other respects most remarkably. Its skin is of a tawny yellowish brown, shading from dark brown on the back to dirty yellow on the belly: it is beautifully covered all over with spots, of the shape and size of those of the leopard, similarly arranged. The value of sharks' fins annually exported from

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Bombay amounts to betwixt a lakh and a half and two lakhs of rupees : the largest fishery at any given port is probably that of Kurrachee, which affords nearly one-tenth of the whole, but the shark-fishery is conducted all along our coasts. The fishermen along these coasts are divided into four great castes, over each of which a head man or jumadar presides. 1, Wayttee ; 2, Sôn-kolie ; 3, Dôngur-kolie ; 4, Thankur-kolie. One great jumadar, or chief, rules supreme in the craft over all the fisher castes. Our principal informants at Kurrachee were a chief of one of the castes and his brother,—two of the finest men we ever saw. They were six feet three each, nearly of a height, powerfully made and muscular in proportion, but not overgrown : they had fine brown hands, long black hair and bushy eyebrows, with fine white teeth, and a singular openness of countenance and pleasingness of expression. They seemed greatly flattered by our enquiries, and most willing to give information on every point but one—that of the amount of sharks caught. They were quite delighted with the sketches made of their boats and implements.—*Bombay Monthly Times, from 11th to 24th May, 1850.*

We now return to the subject of Native Arts and Manufactures ; in our last we were obliged to omit the observations we had proposed to give continuously until the subject so far as we were able to deal with it was exhausted.

*Stone-Cutting.*—Before concluding the account of stone-cutting, we must give a short notice of the seal-engraver's tools and wheel. The latter consists of a slight framé ballasted below to keep it firm, with two uprights about eighteen inches in length and eight inches between. Betwixt the two is a small spindle, of the form represented in the adjoining cut. This turns at the one end on a screw or pivot, sometimes of cornelian : the shoulder is kept in its place by a neat iron clamp—it is steadied by a piece of rag wrapped round it and enclosed in the collar. Why so much pains should be taken to diminish friction by a cornelian pin at one end, while it was increased by this at the other, we cannot explain. A dozen or two spindles such as this are made use of. The spindle is terminated by a small spike of iron about an inch long, ending in a little circular saw or button, from a tenth up to half an inch in diameter. To this, emery paste—that is, powdered corundum mixed with oil—is from time to time applied, while it is spun round with a bow. The engraver holds the seal up betwixt his fingers and thumb, and a sweep or two of the bow causes a mark on the seal. This is deepened and extended as desired—the larger discs being employed for long straight strokes. The work turned out is by no means very fine, but the celebrity of execution is surpassing. Diamond dust is

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very rarely used in India,—corundum, koorund, or sanda stone as it is called, being the chief material employed in polishing gems, marbles, and metals. This mineral is found chiefly in granite or the detritus of granite rocks in the Mysore country and in the neighbourhood of the south-western ghauts. It is brought in considerable quantity to Bombay, and is occasionally exported to Europe. It is packed in orange-shaped parcels with meridional cordings : the pieces are from the size of filberts to that of the hand : they are generally amorphous or fragments of crystals, often contaminated with felspar, mica, and other granitic minerals. Sometimes fragments of crystals perfectly pure are to be met with weighing from ten to twenty-five pounds, but these are rare. Though excessively hard, it is by no means tough—it flies in pieces after a few strokes of the hammer, and is easily pulverized in a mortar. The natives generally beat it on an anvil or stone, keeping it from flying about by a collar of cotton rope. The fine particles are separated from the coarse by sifting—we are not aware that the home process of lixiviation is resorted to. For sharpening swords or burnishing metal it is generally used like a whetstone or burnisher ; for polishing gems, it is either made up into a cake with lac or into a paste with oil or grease. It is never employed for the manufacture of emery paper, or anything resembling it. For polishing marble or other stone it is used in two forms : the first of these is a cake of about eight inches long, three across, and two deep, of this form. This is used by an individual in the hand. For heavier purposes, a cake a foot square or so is employed, placed in a frame after this fashion. Two men work at this, and the reducing process is very rapidly accomplished by it : it is in fact a file with a lac body and corundum teeth. This concludes our sketch of lapidary operations : we are aware of its being in the last degree imperfect and shall be thankful to any one who will fill it up, correct, or extend it. We have not been able to discover a single syllable on the subject in any printed book. The diamonds seen in such abundance amongst our native gentry are almost all cut in England, and our principal gems here are the lapis lazuli, rubies, emeralds, opals, garnets, and the whole family of siliceous gems.

(160) *Bombay or Mooltan Work.*—The inlaid work of ivory, white and dyed, ebony or other coloured woods, for which Bombay has long been famous, is said to have been introduced from the Punjaub, and is still familiarly known as Mooltan work. It consists chiefly of paper-cutters, work-boxes, writing-desks, and other similar articles. The effect of a large mass of it is very poor—the pattern is too fine for being distinguishable, and it fills the eye with a general greyish tint : in



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articles which do not present more than a foot or two of surface, it is very pleasing. The ground of the inlaid pattern is generally scented cedar or sandalwood, the joinery exhibited in which is very indifferent. The inlaying material is prepared as follows: the wood or ivory is cut into slips of a lozenge or triangular section, as may be required—by a long thin-bladed fine-toothed saw. The tin is drawn through betwixt a pair of grooved rollers like those used for laminating or extending iron—they work together by teeth at the extremity: one or two draws through extends the metal into the length desired. The wires and splints are nearly all either lozenge-shaped or triangular, the triangles being equilateral, the lozenges composed of two equilateral triangles. A pattern being fixed on, the splints are built up into pieces, about eighteen inches long, and from a quarter to two inches in thickness, firmly glued together. In the case of boarders, or continuous pieces of work, the rods are glued together betwixt pieces of ivory, or wood and ivory, alternately, so as to form straight lines on each side of the pattern. When about to be used they are sawn across the thickness of a sixpence, and arranged in a box divided into compartments, something like a printer's case. They are then picked up in succession, and applied with glue to the box or other article to be inlaid. The following is a list of the prices of some of the most common articles to be met with in the bazar:—

Work Boxes, of sizes, from.....	Rs. 8 to 80
Writing Desks, of do, from.....	Rs. 15 to 60
Portfolios, of do, from.....	Rs. 10 to 20
Watch Stands, from.....	Rs. 8 to 10
Do. Cases, from.....	Rs. 4 to 6
Envelope Cases, from.....	Rs. 15 to 25
Baskets, of sizes, from.....	Rs. 6 to 25
Cheroot Cases, from.....	Rs. 3 to 4
Card Cases, of sizes, from.....	Rs. 2 to 5
Paper Weights, from.....	Rs. 3 to 4
Paper Cutters, from.....	Rs. 1 to 3
Baskets, open work, from.....	Rs. 12 to 15
Table Trays, from.....	Rs. 10 to 15
Pin Cushions, from.....	Rs. 3 to 4
Ink Stands, from.....	Rs. 10 to 15
Jewel Boxes, of Sandal Wood, from.....	Rs. 20 to 50
Paper Stands, of Sandal Wood, from.....	Rs. 5 to 10

(161) *Blackwood Furniture.*—We are so imperfectly acquainted with the history of the Bombay Furniture manufacture that we must confine ourselves to a few details of the process by which it is made. Blackwood is the material almost always employed—it is brought from Cochin and other places lower down on the Malabar Coast. It sells for about the same price as Teak—it is a brittle, open-grained wood not at all a favorite with cabinet-makers at home, and the highest prices ever realised for it in the state of log were we believe about £10 per ton. The principal furniture dealers in Bombay, when this was written in 1850, were Par-

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Goozerat. The pattern meant to be carved is first carefully drawn on paper—then on the wood. The tools used are the native adze, chisel, and drill—the centre-bit and other tools of English pattern, from which so much assistance might be obtained, are never resorted to. The general design of the various pieces of furniture is mostly excellent, the patterns elegant and tasteful: the finish for the most part is poor,—the joinery always execrable. Concealed joints never seem to be thought of—pins which might be kept out of view are made as conspicuous as possible, and great clumsy screw nails, which might without trouble be hid, are fully exposed to view. Considerable quantities of blackwood furniture are sent home annually by residents in Bombay for their own after use, or for the service of friends: it is packed up without being jointed or polished, and is put together by English workmen, who think, we believe, but lightly of its merits. There were then six principal furniture shops in Bombay,—those of Messrs. Sorabjee Framjee, Sapoorejee, Byramjee, Pestonjee Eduljee, Rustomjee Nowrojee, Jamsetjee Limjee, and Manockjee Nowrojee. They keep from five to ten workmen each, and probably turn out Rs. 25,000 to Rs. 30,000 worth of furniture amongst them annually. The following are the prices of the principal articles manufactured:—

Round Table, from 3 to 8 feet in diameter...	Rs. 30 to 80
Do. Teapots, 2 feet ditto, per pair.....	Rs. 16 to 25
Card Tables,..... do.....	Rs. 50 to 60
Flower Stands..... do.....	Rs. 50 to 100
Pier Tables..... do.....	Rs. 100 to 150
Conversation Sofas..... do.....	Rs. 100 to 150
Sofa Couches..... do.....	Rs. 140 to 200
Music Book Cases..... do.....	Rs. 80 to 140
Easy Chairs, each.....	Rs. 10 to 50
Low Chairs, each.....	Rs. 25 to 50
Drawing Room Chairs, with damask cushions.....	Rs. 5 to 10
Dressing Tables, each.....	Rs. 8 to 75
Side Boards, each.....	Rs. 35 to 70
Screens, each.....	Rs. 20 to 75
Wardrobes, each.....	Rs. 45 to 75
Clothes Presses, each.....	Rs. 25 to 40
Bedsteads, each.....	Rs. 50 to 200
Writing Tables, each.....	Rs. 50 to 100
Bed Room Couches, per pair.....	Rs. 40 to 60
Chiffoniers, each.....	Rs. 60 to 80
Sofa Tables, per pair.....	Rs. 60 to 90
Dining Table, in pieces.....	Rs. 40 to 50
Chests of Drawers, each.....	Rs. 25 to 50
Music Stands, per pair.....	Rs. 30 to 50

*Oil Manufacture.*—Fish oils are the only animal oils we possess in India—the manufacture of these we have already endeavoured to describe. The number of vegetable oils we possess is very great indeed—we must, however, confine ourselves to a notice of the manufacture of a small number of these. We are acquainted with two forms only of the native oil-mill: one of these will be found described under Sugar-making, it being used alternately as an oil or sugar-mill—the other, of which there are some varieties, is a simple wooden mortar, with revolving

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Francis Buchanan's description of the oil-mill of Bangalore: it closely resembles the model of that of Belgaum, lately sent to the presidency, only that the latter is of wood, the former of stone—generally granite. Two oxen are harnessed to the gearing which depends from the extremity of the pestle—a man sits on the top of the mortar, and throws in the seed that may have got displaced. The mill grinds twice a day,—a fresh man and team being employed on each occasion. When sesamum oil is to be made, about seventy seers measure, or two and a half bushels, of seeds are thrown in: to this ten seers, or two quarts and three quarters, of water are gradually added: this, on the continuance of the grinding, which lasts in all six hours, unites with the fibrous portion of the seed, and forms a cake, which, when removed, leaves the oil clean and pure at the bottom of the mortar. From this it is taken out by a coconut shell cup on the pestle being withdrawn. Other seed oils are described by Buchanan as made almost entirely in the same way as the sesamum. The exceptions are the larula, or castor oil, made from either the small or large varieties of the ricinus. This at Seringapatam is first parched in pots containing something more than a seer each. It is then beaten in a mortar and formed into balls: of these from four to sixteen seers are put in an earthen-ware pot, and boiled with an equal quantity of water for the space of five hours—frequent care being taken to stir the mixture to prevent it from burning. The oil now floats on the surface, and is skimmed off pure.

The oil-mill made use of at Bombay and to the northward, at Surat, Cambay, Kurrachee, &c., differs a little from that just described, in having a very strong wooden frame round the mouth of the mortar: on this the man who keeps the seeds in order sits: in Scinde a camel is employed to drive the mill instead of bullocks. Castor oil seed is thrown into the mill like other seeds, as already described:—when removed it requires to be boiled for an hour, and then strained through a cloth to free it of the fragments of the seed. The great oil on the seaboard of India is that yielded by the Coconut Palm. The nut is first stripped of its husk, this furnishing the substance from which coir rope is made, while the shell is broken, and the copra, or fatty lining, enclosing the milk is taken out. This is called cobi or copra. Three maunds or ninety pounds of copra are thrown into the mill, with about three gallons (eleven cutcha seers) of water, and from this is produced three maunds, or seven gallons and three quarters, of oil. The copra in its unprepared state is sold slightly dried in the market: it is burned in iron cribs or grates on the top of poles as torches in processions, and as means of illumination for work performed in the open air

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at night. No press or other contrivance is made use of in India for squeezing out or expressing the oil from the cake, and a large amount of waste in consequence of this necessarily ensues. We are unable to afford a description of the manufacture of the sandalwood, grass, and other essential oils employed in medicine.

*Tanning*—Leather is one of the manufactures where, with an unbounded quantity of excellent raw material, the results are most unsatisfactory: with an unlimited supply of hides and first-rate bark, the goods turned out are of the worst possible description. The raw hides on first being received are steeped in stone vats for betwixt four and five weeks in a strong pickle of salt and water—from ten to fifteen hides are placed in each vat. While steeping, a pint or quart of the milk bush is thrown into each vat. As we may not have occasion to allude to this subject under a separate head, we may mention that the juice of the milk bush (*Euphorbia tirucalli*—Roxburgh, page 470, Graham, page 179) contains a considerable quantity of elastic gum, and is used for water-proofing leather, and rendering cords elastic. In February and March, Parsee females are to be seen with various male attendants wherever the milk-bush prevails. They apply the milk to their bodies and limbs, and then stick themselves over with tufts of raw cotton. It produces a hot and slightly prickly feeling and a small degree of blistering. It is considered good for the health, and is supposed to ensure fecundity: the exhibitions seen at this season in applying the milk, are often indelicate in the extreme. Dr Heyne (Tracts, Historical and Statistical, on India, &c., vol. 1, page 46, London 1814) states that the Morocco manufactured at Hurryhur is treated with salt, and a mixture of water, and the milk of wild cotton, (*Asclepias gigantea*), but though he favours us with a chapter on the milk of plants, he neither explains its qualities nor the function it performs in tanning. The stench arising from the vats is at this time abominable: the epidermis is now decomposed, and the hair comes freely away. The skin, being cleared of this, is next immersed in a decoction of mangrove, babool, or other tanning bark: after remaining some time in this they are taken out and sewed up so as to form a sack, and are then suspended from the roof of the building, filled with fresh tanning solution. When the process is completed they are taken down, the stitches cut, and the skins dried. The leather is soft and flexible, and looks tolerably well—but it resists the rain indifferently, is easily penetrated by wet, and during the S. W. Monsoon becomes as moist and flexible as paper dipped in water. When set aside it becomes mouldy, and very easily rots. Buchanan gives the following as the method of tanning practised



at Bangalore:—For each hide of ox or buffalo take two seers of quicklime and six seers of water: in this keep the skins a week, when the hair may be rubbed off. Keep the hides four days in a solution of unpeeled sticks of Tangadu (*Cassia auriculata*), in ten seers of water, for an equal length of time: add the same solutions as before—then stretch and dry the hides. The leather is very bad. Tracts, Vol. 1., p. 228.

**Potstone**—Is found in various parts of India on the western coast: it is chiefly prevalent at Turreva Carey in the Madras presidency, and in the ghaut country from betwixt the Phoonda and Ram Ghauts. It is called Bellapum by the natives: it was known to the Romans, and is described by Pliny as used in the manufacture of vessels for culinary purposes—hence its name. The mineral possesses a glistening pearly lustre and greyish tint: it contains 49 per cent of silica, 30 of magnesia, and 6 of alumina. The stone is prepared for use by reducing it to something like the form, size, and shape desired, by a cleaver, a panned hammer, or strong knife. When a cavity is meant to be circular, it is bored out by being held against the working spindle of a single-centred native lathe. This enables them to be held on by the chuck, when they are chucked and finished in the lathe in the ordinary way. Potstone speedily hardens and darkens by exposure to the air: it absorbs grease, oil, or fatty matter, freely: it is stronger than ordinary earthen-ware, stands heat better, and is pretty extensively used for culinary purposes. That sold in the Bombay bazar is mostly brought from Goa.

(162) **Bombay Fisheries**.—We do not here propose attempting a description of the Bombay fishing boat—now allowed to be one of the swiftest and most elegant sea-going vessels we possess. A complete set of models of the native vessels plying on the coast, at an estimated price we believe of Rs. 15 each, or about Rs. 1000 in all, is in course of preparation for the Exhibition of 1851, and we can scarcely imagine anything more valuable or interesting. The mode of building is not a little singular, being, like most other processes, amongst us, precisely the reverse of that pursued at home. We begin with drawing the lines, then lay down the keel, ribs, and frame, and finally apply the planking. In India we dispense with drawn lines altogether:—having laid down the keel we fasten on the planking, leaving the ribs and frame to the last. The keel having been laid, and the stem and sternposts put in their places, they are fashioned in both sides with a groove of this form. The lower edge of the plank next laid is made to conform in shape to this. The under groove is smeared over with red ochre and water, and the edge of the plank that follows tried on from time to time till it takes a tinge everywhere, showing

with what exactness it coincides. It is then steeped in water and bent over a fire of wood into the proper shape and applied to its place. When all is ready, the channel in the lower plank is filled up with cotton and tar. The two planks are now sewed together in the following manner: a pair of holes are bored in the upper and a corresponding pair in the lower plank, all along at intervals of a foot or two, according to the nature of the lines: a strong coir string is laced through this in the form of the letter X, the knot being inside. A stout wedge of wood is next driven through the strings outside, so as to bring the planks perfectly in contact. The planks being put sufficiently in their places, when gunwale high is attained, the timbers are put in: when the planks have been nailed to them, the sewing holes are filled up either with nails when opposite a timber, or with wooden pins. The home reader may perhaps be informed that the Bombay fishing-boats beat the best of our English yachts: the masts rake forward instead of back—the keel is hollow in the middle and not so long as the stern-post, —the forepart of the boat sharp, with hollow lines, the stern plump and round. The following rude diagrams will give some imperfect idea of our meaning:—

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Hooks and lines are scarcely ever used on our shores,—nets of various forms and sizes being alone almost employed in catching fish. The most important and extensively practised variety is the stake-net fishing,—and stakes are often to be found thirty and forty miles out at sea—wherever, indeed, a bank within half a day's sail of land presents itself: the fishermen are quite enterprising enough to extend their operations to any distance, but there is no use in their going further off than they can return with their fish to the market fresh. The fishing stakes vary from 50 to 150 feet in length: they are built up in the following manner of successive pieces of wood,—the lower being frequently the long straight trunk of the coconut or palmyra tree. As many as five or six pieces of wood, from eight to ten inches in diameter, are used in the construction of a single stake. They are scarfed across each other, the scarfing being from three to five feet: the pieces are fastened together by strong rectangular fillets of wood of this fashion—Two or three boats are employed in towing the stake out to sea. Its point is made wedge-shaped—there is a hole near the point of the wedge, through which a rope is passed. The two ends of the rope are made fast to boats anchored at a considerable distance off: other boats now proceed and haul up the upper end of the stake till the point is found to descend by its own weight. When it has once caught hold of

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the mud the rope is released from its lower end, and the boats to which it was attached employed in steadying the top in the direction of the run of the tide. At high water two boats are made fast, one on each side, to the top of the stake, which is forced by their weight ten or twelve feet into the mud. Stakes are thus put in successively, often to the extent of some miles, at intervals of twenty feet from each other. Between each pair is extended a long purse-net, the circumference of the mouth of which is about sixty feet, so that when attached to the stakes it exhibits an aperture twenty feet across, and ten feet perpendicularly—the upper edge being a little above high water. The purse is from 100 to 170 feet in length, terminating in a point. The meshes gradually diminish in size from the mouth to the further extremity, being about six inches at the former, and three-fourths of an inch at the latter. The fish are carried into this by the tide, and entrapped—boats are always in waiting at high and low water, to secure the capture and reverse the nets. In the creeks and shoals lines of stakes and nets, often several miles in length, are run along where the sludge is exposed at low water. The upper edge of these is considerably under high water mark, and the fish are in consequence entrapped by them on the retirement of the tide: breaks are left at intervals to secure their admission. Close along shore, fishing grounds, about half an acre in area or so, and in a semi-circular form, are built. An aperture is left in the extremity of each of these, into which a net is placed as the tide begins to recede, and a considerable capture of the lesser sized fish secured. Such are the fixed implements of the fisherman: the moveable engines of destruction are few and simple. The most frequent of these is a conical net, of which the lower lip is loaded with pieces of lead and turned up inwards. The material of which it is made is fine, and the meshes small. It is from eight to twelve feet in diameter, and is only used in shore. The fisherman holds it by the top, while he gives it a quick twirl, something betwixt that given to the American lasso and common quoit. Throwing it to the distance of some yards, it spreads fully out as it reaches the water—when pulled down and collapsing by means of the lead, it closes at the mouth as it approaches the bottom. The fisherman now approaches and pulls it up by the apex, when the fish are found entrapped in it. Though this net sometimes attains a weight of sixty pounds—the dexterity with which it is thrown is wonderful. There are various spoon and purse-nets of different shapes and sizes, and a bag of muslin on a hoop about three feet in diameter, this last being employed to catch the young prawns, and smallest sized fish, that would escape through any mesh—however fine. There is

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also a long trail-net, with which the fishermen wade neck deep through the water, but the mode of using it does not appear to be in any way peculiar or interesting. The mud banks and shoals in our creeks abound in Eels, sometimes reaching the length of two or three feet. The fishermen wade through the mud till they detect these by the bubbling up or disturbance of the water. They then strike them with a harpoon or spear of the fashion here represented, and about two inches each way, with a fine bamboo shaft eight or ten feet in length. Having pinned them against the ground they draw them out with a hook about the same size as the spear, also on a shaft. They are very dexterous in catching the little fish or crabs which lurk under the stones close by the shore, with their hands without the use of any instruments at all: the crabs when caught are immediately stripped of their claws, and so prevented from getting away. Of these we have a wonderful variety on our shores, many of them of the greatest beauty. The fisherman's mooring anchor is generally of stone, from four to five feet in length, of the form represented in the adjoining drawing. The stone is four-sided and pyramidal—the apex cut off. At base it is from six to eight inches square, and from four to six at top. Through the top is a hole, through which a cable or hawser passes. Near the base are two holes at right angles to each other: through these pieces of wood are thrust corresponding to the prongs or flukes of the anchor. The whole weighs from 80 to 150 lbs., according to the size of the vessel, and answers very well the purposes intended. These anchors are most commonly made of limestone, and are on the whole most suitable.

The fishermen are a strong-made race of men, and the only variety of labourers in India amongst whom a great degree of obesity is observed,—every fourth or fifth fisherman to be met with being more or less corpulent—some of them very much so indeed. They are much given to the use of intoxicating drinks, and are often to be met with in a state of inebriety. They regulate their affairs very much after the manner in which they are regulated by those of kindred professions in other parts of the world. A set of boats and nets belong to a dozen of fishermen, one often advancing the capital required to be contributed by the others; the capture is divided amongst them on their reaching the shore, and is immediately taken charge of and carried to market by the women, who carry their baskets, not, as at home, on their backs, but on their heads. The men when so employed carry theirs in baskets swung at the opposite ends of a bamboo across the shoulders. The women who carry the fish to market are commonly followed by ten or a dozen crows, who constantly



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watch for anything that may escape, every now and then making a dash at the basket itself.

The mode of making ropes and nets is singularly simple: coir is the material used for the former, cotton or hemp for the latter. One man sits on the ground and lets out the yarn; another retires half bent, and spins it by means of a spindle,—the yarn being passed through a wooden hoop hung round his neck. He gives the spindle a jerk betwixt the palms of his hands, and keeps its motion up at a very considerable degree of speed indeed. When several piles of fine yarn are to be twisted together, a man with a spindle is placed at the end of each. The whole series are supported at intervals by frames of bamboo: a spinner at the further extremity twists all the strands into one, while a light piece of board is being passed along where the cords are meant to be hard plaited and strong, to keep them from running too rapidly together. In the case of ropes, after the single strands are laid together, the rope is made up by men twisting the larger strands by a stout piece of wood thus,—a much stronger and longer piece being used for the entire rope, a man sitting by a board with holes through which the several strands pass, to see that all go properly together. To see forty or fifty five powerful men busily employed in the evening in sewing a cord betwixt each of the cloths of a sail—the sails of a pattimar being often from seventy to ninety feet wide,—with the accompaniments of swarthy dames and children,—boats of the most picturesque forms,—palm trees or an old Mahratta fort in the distance, and fishing tackle every where around,—is frequently highly picturesque; the sight being much more pleasing than the smells which accompany the scene.

We are unable to give any account of the population of the fishing villages beyond our own immediate neighbourhood, the number or cost of the boats or implements employed by them, or value of their industry, though information on all these heads would be eminently interesting, and ought to be easily enough attainable. The following in reference to the three great fishing villages in our own little Island,—Worlee, Sewree, and Mahim,—will illustrate what is desired to be obtained. At WORLEE there is one pattimar, worth about Rs. 3000, employed in carrying cargo and in general business. There are 110 fishing-boats, worth about Rs. 350 each, and 45 canoes, worth from Rs. 40 to Rs. 60 each. At SEWREE there are five large boats, worth about Rs. 1000 each, employed in carrying bricks and tiles from Salsette to Bombay; one pattimar, worth about Rs. 3000, employed in general trade; 23 fishing-boats, worth about Rs. 350 each; and 50 canoes. There are, besides, some 20 middling-sized boats, used in the transport

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of chunam and of black sand from Bellapore for building and other purposes. At MAHIM and in the creek on to Sion there are 7 fishing-boats, 10 large chunam boats, 10 small, together with 25 canoes. The fishermen of Small Colaba own no more than 16 fishing-boats and 8 canoes. A pattimar employs from 15 to 20 men, a fishing-boat from 10 to 15, a canoe from 3 to 4. Canoes are chiefly employed in the coast-fishing and attending the men on the mud banks, and in landing cargo when there is not depth of water sufficient for larger vessels. They are hollowed out of a single log, and are very serviceable handsome-looking well-finished craft. They are impelled either by paddles or sails: when the latter are employed, an outrigger is resorted to: they will bear a surprising stretch of canvas, and make their way rapidly through the water.

*Distillation.*—The principal matters distilled in India are Toddy, Dates, Sugar, Rice, and substances yielding perfumes. As it is with the arts as practised on this side of India, we are chiefly concerned, we shall commence with the Bombay Toddy or Arrack Still, one of the most simple and clumsy contrivances that can well be imagined. The still consists of a large earthen jar, of the shape of that used by water-carriers, but many times more capacious. The receiver is of the same form and material as the still, but somewhat less in size,—the former being two and a half, the latter one and a half, feet in diameter. The still mouth is plugged up with a piece of wood luted with clay—a hole is cut in the side of the still near the top, and into this is fastened a wooden spout, which conveys the spirituous vapour to the cooler. This last stands on a tressle or frame of wood, placed over a pit for holding water, and cooling is effected by a man lifting successive fills of water from the well in a coconut ladle, and pouring it on the top of the cooler. We have seen no case where a contrivance so simple as a vessel of water with a small spout or drip has been resorted to. A coconut tree will yield about four seers of toddy or sap a day: seventy-five seers of toddy, or the produce for one day of eighteen coconut trees, furnish a charge for a still, yields twenty-five seers of liquor on a first distillation—on the second it affords eight seers of liquor considerably under proof. Loose as this mode is of stating matters, we have not been able to make it more exact: we know of no author who furnishes information as to the quantity of sugar contained in toddy, and the amount of spirit of a given strength it ought to yield, and have not had leisure to determine these facts for ourselves,—a sad instance of the want of familiarity with the principles and details of the most common branches of industry prevailing around us. One thing seems certain, that the process of distillation just described is nearly as unskilful as can

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be, and that a third, if not a half, might be added to the returns were a little more care and attention bestowed on the matter.

Date and Palmyra trees yield toddy as well as cocoanuts—we do not know in what quantity per tree, or of what strength.

A strong liquor, called Mowah, is in popular repute amongst the natives, especially the Parsees, in Western India. The following process is employed in making it at Surat—we have not seen any Mowah still at Bombay. The berries of the Mowah are about the size and form of marbles: they are first steeped or mashed in casks. So soon as they get into a state of active fermentation, the fermented liquor is drawn off and carried to the still, and more water poured over the berries, successive charges being added as long as the worts are strong enough to ferment. A sufficient number of casks, or mash tuns as they may be called, are employed in the work so as to permit a charge of the still to be supplied on each drawing off from the fermenting tuns: as it takes a couple of days to complete the process of fermentation, but worts already drawn off would sour were this to be waited for before that first run was run off. The still consists of a wooden tub, with a copper bottom, built over a furnace of brickwork:—over the mouth of this is placed a huge copper saucer, the centre of the bottom terminating in a nipple. This is placed over the mouth of the tub which contains the liquor, and is fitted tight after the still has been charged: it is then filled with cold water, a fresh supply of which is poured into it from time to time as the original fill gets heated. A bamboo spout passes through the side of the tub just above the level of the liquor inside—it terminates in a flat shovel or ladle shaped dish under the nipple. Into this the spirit condensed in the under side of the saucer trickles down—it is run off and removed into a suitable receptacle outside. A second or third distillation is resorted to when the liquor is required to be made very strong. We have still more grounds here than in the preceding case to complain of our deplorable want of facts—a want which might be so readily supplied by the medical or scientific officers in the neighbourhood.

The Portuguese use, for the purpose of rectification, is a very neat and serviceable variety of still, by them called an Alembic. It consists of a common looking pot as a boiler, with a cylindrical head of the same diameter, and generally about the same depth, as the boiler. The bottom of this is a cone closed in at the apex, the mouth of which covers that of the boiler. Around its inner edge is a slight turned-up ledging or flange, from which a pipe or worm leads off the spirit. The cylindrical portion of the top being filled with cold water, the spirituous

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vapour is condensed by it in the inside of the cone, and, trickling down, is caught by the flange and carried off by the pipe. This is a convenient and serviceable implement, and may be so used to give very excellent results.

Our account of distillation would be incomplete without some description of the manufacture of rosewater and otto of roses, borrowing from the 8th volume of the Transactions of the Bengal Asiatic Society, the account given of it by Dr. Jackson, Ghazee-pore:—

“Around the station of Ghazee-pore there are about 300 beegahs, or about 150 acres, of ground laid out in small detached fields as Rose gardens, most carefully protected on all sides by high mud walls and prickly pear fences, to keep out the cattle. These lands, which belong to Zemindars, are planted with Rose trees, and are annually let out at so much per beegah for the ground, and so much additional for the Rose plants—generally five rupees per beegah, and twenty-five rupees for the Rose trees, of which there are 1,000 in each beegah. The additional expense for cultivation would be about 8-8; so that for Rupees 20-8 you have for the season one beegah of 1,000 Rose trees.

“If the season is good this beegah of 1,000 Rose trees should yield one lac of Roses. Purchases for Roses are always made at so much per lac. The price of course varies according to the year, and will average from 40 to 70 Rupees. During the past season the latter was the price given for one lac of Roses towards the conclusion.

“As soon as the Roses come into flower the Zemindar and cultivators of the Rose gardens, as well as intending purchasers, meet in the city, and according to the demand and expected produce, a *nerick* is established, and purchasers then enter into agreement with the cultivators for so many lacs of Rupees at such a price. This agreement is considered binding, and the cultivator is obliged to deliver the quantity at the contract rate; when that is completed another can be made, but this latter is always at a much higher rate.

“The Rose trees come into flower at the beginning of March and continues so through April. In the morning early the flowers are plucked by numbers of men, women, and children, and are conveyed in large bags to the several contracting parties for distillation. The cultivators themselves very rarely manufacture.

“The native apparatus for distilling the Rosewater is of the simplest construction; it consists of a large copper or iron boiler well tinned, capable of holding from eight to twelve gallons, (shaped like the earthen hoondahs in which the Gomastahs send in their Opium) having a large body with a rather narrow neck, and a mouth about eight inches in diameter; on the top of this



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is fixed the head of the still, which is nothing more than an old *degchee*, or cooking vessel, with a hole in the centre to receive the tube or worm.

"This tube is composed of two pieces of bamboo, fastened at an acute angle, and it is covered the whole length with a strong binding of corded string, over which is a luting of earth to prevent the vapour from escaping. The small end, about two feet long, is fixed into the hole in the centre of the head, where it is well luted with flour and water. The lower arm or end of the tube is carried down into a long necked vessel or receiver, called a *bhubka*. This is placed in a hundee of water which as it gets hot is changed. The head of the still is luted on to the body, and the long arm of the tube in the *bhubka* is also well provided with a cushion of cloth, so as to keep in all vapour. The boiler is let into an earthen furnace, and the whole is ready for operation.

"There is such a variety of Rose-water manufactured in the bazar, and so much that bears the name, which is nothing more than a mixture of sandal oil, that it is impossible to lay down the plan which is adopted. The best Rose-water however in the bazar may be computed as bearing the proportion of one thousand Roses to a seer of water; this perhaps may be considered as the best procurable. From one thousand Roses most generally a seer and a half of Rose-water is distilled, and perhaps from this even the Attar has been removed.

"The boiler of the still will hold from eight to twelve or sixteen thousand Roses. On eight thousand Roses from ten to eleven seers of water will be placed, and eight seers of Rosewater will be distilled. This after distillation is placed in a carboy of glass, and is exposed to the sun for several days to become *puckah*; it is then stoppered with cotton, and has a covering of moist clay put over it; this becoming hard effectually prevents the scent from escaping. The price of this will be from twelve to sixteen rupees. This is the best that can be procured.

"To procure the Attar, the Roses are put into the still, and the water passes over gradually as in the Rose-water process; after the whole has come over, the Rosewater is placed in a large metal basin, which is covered with wetted muslin tied over to prevent insects or dust getting into it; this vessel is let into the ground about two feet, which has been previously wetted with water, and it is allowed to remain quiet during the whole night. The Attar is always made at the beginning of the season when the nights are cool; in the morning early the little film of Attar which is formed upon the surface of the Rosewater during the night is removed by means of a feather, and it is then carefully placed in a small phial; and day after day as the collection

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is made it is placed for a short period in the sun, and after a sufficient quantity has been procured it is poured off clear, and of the colour of amber, into small phials. Pure Attar when it has been removed only three or four days has a pale greenish hue, by keeping it loses this and in a few weeks' time it becomes of a pale yellow. The first few days distillation does not produce such fine Attar as comes off afterwards, in consequence of the dust or little particles of dirt in the still and the tube being mixed with it. This is readily separated from its sinking to the bottom of the Attar, which melts at a temperature of 84°. From one lac of Roses it is generally calculated that 180 grains, or one tolah, of Attar can be procured; more than this can be obtained if the Roses are full sized, and the nights cold to allow of the congelation. The Attar purchased in the bazar is generally adulterated, mixed with sandal oil or sweet oil; not even the richest native will give the price at which the purest Attar alone can be obtained, and the purest Attar that is made is sold only to Europeans. During the past year it has been selling from 80 to 90 rupees the tolah; the year before it might have been purchased for 50 rupees. Native stills are let out at so much per day or week, and it frequently occurs that the residents prepare some Rose-water for their own use as a present to their friends, to secure their being provided with that which is the best. The natives never remove the calices of the Rose flowers, but place the whole into the still as it comes from the gardens.

"The best plan appears to me to have this removed, as by this means the Rose water may be preserved a longer time, and is not spoiled by the acid smell occasionally met with in the native Rose-water. It is usual to calculate 100 bottles to one lac of Roses. The Rose-water should always be twice distilled; over ten thousand, Rosewater may be put to allow of sixteen or twenty bottles coming out; the following day these twenty bottles are placed over eight thousand more Roses, and about eighteen bottles of Rosewater are distilled. This may be considered the best to be met with. The Attar is so much lighter than the Rose-water, that previous to use it is better to expose the Rose-water to the sun for a few days, to allow of its being well mixed, and Rose-water that has been kept six months is always better than that which has recently been made.

"At the commencement of the Rose season, people from all parts come to make their purchases, and very large quantities are prepared and sold. There are about thirty-six places in the city of Ghazeepore where Rosewater is distilled. These people generally put a large quantity of sandal oil into the receiver, the oil is afterwards carefully removed and sold as sandal Attar,

and the water put into carboys and disposed of as Rose-water. At the time of sale a few drops of sandal oil are placed on the neck of the carboy to give it a fresh scent, and to many of the natives it appears perfectly immaterial whether the scent arises solely from the sandal oil or from the Roses; large quantities of sandal oil are every year brought up from the south and expended in this way.

"The chief use the natives appear to make of the Rose-water, or the Sandal Attar as they term it, is at the period of their festivals and weddings. It is then distributed largely to the guests as they arrive, and sprinkled in profusion in the apartments. A large quantity of Rose-water is sold at Benares, and many of the native Rajahs send over to Ghazee-pore for its purchase. Most of the Rose-water as soon as distilled is taken away, and after six months from the termination of the manufacture there are not more than four or five places where it is to be met with.

"I should consider that the value of the Roses sold for the manufacture of Rose-water may be estimated at 15,000 rupees a year, and from this to 20,000, and from the usual price asked for the Rose-water and for which it is sold, I should consider there is a profit of 40,000 rupees. The natives are very fond of using the Rose-water as medicine, or as a vehicle for other mixtures, and they consume a good deal of the petals for the conserve of Roses, or *Goolcond*, as they call it. There are several kinds of essential oils produced from the strong scented flowers in this district, which I will procure and send down to you."

Other perfumed oils are manufactured without resorting to distillation. The layers of the jasmine, four inches thick and two inches square, or other flowers, are laid on the ground and covered over with layers of sesamum or any other oil-yielding seed. These are laid about the same thickness as the flowers, over which a second layer of flowers like the first is placed. The seed is wetted with water, and the whole mass covered with a sheet held down at the end and sides by weights, and allowed to remain for eighteen hours in this form: it is now fit for the mill, unless the perfume is desired to be very strong, when the faded flowers are removed and fresh ones put in their place. The seed thus impregnated are ground in the usual way in the mill, and the oil expressed having the scent of the flower. At Ghazee-pore, the jasmine and bela are chiefly employed: the oil is kept in dubbers, and sold for about Rs. 2 a seer. The newest oils afford the finest perfumes. The process here described is the same as that pursued at Bombay. In Europe, a fixed oil, usually that of the bean or morunga nut, is employed. Cotton is soaked in this and laid over layers of flowers, the oil being squeezed out so soon as

impregnated with perfume.—*Monthly Bombay Times*, 25th Nov. to 24th June 1850.

(163) ATTA, Pounded-wheat: when sifted *Myda* is the finer part or wheaten flour; and *soojee* the coarser.

(164) ATTALEA FUNIFERA. PIACABA. A most valuable palm, found in the native forests of the maritime provinces of Brazil, the fibres of its leaf stalks and other parts furnishes the best Cordage of South America.

It is a coarse black fibre and obtained from the dilated base of the petioles. It is collected by the natives, and partly used for consumption, partly exported to Europe, tied up in bundles of several feet in length, and sold in London under this name at about £ 14 the ton. It is manufactured into cordage in its native countries, and as it is light, cables made of it do not sink in the water.—*Seeman*.

*Coquilla Nuts* are produced in South America, in the Brazils, by the *Attalea funifera*, according to Martius, for the *Cocos lapidea* of Gartner; the latter title is highly descriptive. The plant might advantageously be introduced into Southern Asia. The coquilla nut shell is nearly solid: two separate cavities, each containing a hard, flattened, greasy kernel, generally of a disagreeable flavour: the cells occasionally enclose a grub or chrysalis, which consumes the fruit. The passages leading into the chambers are lined with filaments or bristles, and this end of the shell terminates exteriorly in a covering of these bristles, which conceal the passages; this end is consequently almost useless, but the opposite is entirely solid and terminates in the pointed attachment of the stalk. Sometimes the shell contains three kernels, less frequently but one only, and one coquilla nut has been seen entirely solid. The substance of the shell is brittle, hard, close, and of a hazel brown, sometimes marked and dotted, but generally uniform. Under the action of sharp turning tools, it is very agreeable to turn, more so than the cocoa-nut shell; it may be eccentric turned, cut into excellent screws, and admits of an admirable polish and of being lathered. On the whole it is a very useful material, and suitable for a great variety of small ornamental works both turned and filed.—*Holzappel*. Seeman remarks that Coquilla nuts being excessively hard, beautifully mottled with dark and light brown, and capable of taking a very high polish, they are extensively used for turnery work, especially in making the handles of bellpulls, small tops, the knobs of walking sticks, umbrellas and other articles.—*Seeman*.

(165) ATTAR. A set of scented oils or attars from Hyderabad comprise the following.

Moteah	Uttur.	Kaserah	Uttur.
Chumbaley	"	Chumpah	"
Ryatree	"	Gool	"
Inah	"	Banjeree	"



# AVERRHOA BILIMBI.

Burmookce	Uttur.	Sohag	Uttur.
Droolpend	"	Sona Manthre	"
Cuscus	"	Nohrutten	"
Moleserree	"	Sandal	"
Rowseh	"	Muzinah	"

They vary in price from 4 annas to 5 Rs. per tola. A very complete collection of these oils was exhibited, at the Madras Exhibition of 1855, by W. E. Underwood, Esq. comprising,

Oil of Sandal wood.	Oil of Cuscus.
" Star Anise.	" Mint.
" Coriander.	" Nutmeg.
" Pepper.	" Cardamom.
" Bitter orange.	" Indian Southern-wood.
" Cummin.	" Jessamine.
" Screw Pine.	" Bishops weed.
" Cloves	" Sweet Fennel.
" Patchouli.	

(166) ATTEES,

Attees, HIND.

According to Ainslie, Attees is the Hindoo-stanic name of the bark of a species of Betula, used in the northern parts of India for dying Clintz red, and which is sometimes, though rarely, brought to the Coromandel coast.—*Ainslie's Mat. Med. p. 141.*

(167) ATTI NAR, FIGUS-RACEMOSA.

(168) AUNEN WOOD.

Aunenkura, TEL.

(169) AVERRHOA CARAMBOLA. CA-RAMBOLA.

Kamarunga, HIND. and BENG.

The carambola tree bears a sour fruit which makes a good tart, and there is a variety which bears a sweet fruit. The tree, though originally, it is said, from the Moluccas, flourishes well on the Tenasserim Coast, and is quite naturalized.—*Mason.*

*The Fruit.*

Tamartam pullum, TAM.	Carumbola, Carmaranga.
Kumruk, DUK.	SANS.
Tamarta pundoo, TEL.	

This is a five cornered fruit, rather bigger than a hen's egg: when young, it is made into pre-serve; when full grown, it has a pleasant flavor, and is reckoned cooling and aperient.—*Ainslie, page 233.*

The Kamarunga tree is common in Bengal. The five-cornered, green, and juicy fruit contains a large quantity of quadroxalate of potash. It is used as a pickle, in curries, and as an ingredient in several native electuaries. The dyers also employ it very extensively.—*O'Shaughnessy.*

(170) AVERRHOA BILIMBI, Lin. Bilim-bie, common in Bengal; the fruit resembles a small cucumber, and contains an abundant acid juice of similar properties to those of the pre-ceeding species. A syrup is prepared with the juice, and a conserve with the flowers, by the

# ASOKA. JONESIA ASOKA.

native physicians, who use it in the treatment of fevers.—*O'Shaughnessy, page 257.*

*The Fruit.*

Bilimbic pullum, TAM.	Blimbingbooloo, MALAY.
Belumboo, DUK.	Bessee, SUMATRAN.

This is a pleasant tasted but rather too acid fruit. It is commonly made into pickle or pre-serve.—*Ainslie, page 222.*

(171) AVICENNIA TOMENTOSA.

Binabe, BENG. | Pata, Rhede.

Is common in India in low places near the mouths of rivers where the spring tide rises. In the Soondrabund it grows to be a tree of considerable magnitude the wood of which serves the Natives for various economical purposes. On the Coromandel Coasts where it is common it is found in the state of a shrub.—*Rohde M.S.S.*

(172) ASCLEPIAS CURRASSAVICA, the yellow milk weed, is cultivated in China as a flowering plant.—*Williams' Mid. King: p. 288.*

(173) ASCLEPIAS VOLUBILIS. Lin.

Palay keeray, TAM.	Palay koora, TEL.
Nukhikae ke banjee, DUK.	<i>Ains. Mat. Med. p. 255.</i>

(174) ASHES.

Sambool, TAM.	Bhasnuam, SANS.
Boodida, TEL.	

Wood ashes are useful for cleaning metals; enclosed in a bag and dusted through it by striking it on a knife board, it is a good substitute for bath brick for cleaning knives. Balls of Cowdung ashes are sold in the bazars under the Teloogoo name of Vibudi, *Tamul*, Tiroonoot Oondi, and are much used for cleaning Military appointments and brass mountings of harness, &c. In commerce, the term applies to such vegetable ash as the alkaline salts are extracted from.—*Mr. Rhode, M.S.S.*

(175) ASHOORA, Arab. The first ten days of the month Mohurram, or the Ceremonies observed during that part of the month. Houses are appropriated in which they set up Allums, Taboots, Shahnusheens, Booraq's, &c., and sometimes screens made of mica. These places are called the Ashoor Khanah (ten day house); Tazee Khanah (the house of mourning); and Astana (a threshold or faqueer's residence). In Upper Hindustan opulent Mahomedans erect an Emambara, and the Shiahs generally follow a similar practice.—*Herklots.*

(176) ASOKA; JONESIA ASOKA. The Asoka, in spring, bears beautiful red blossoms. This tree says LadyFaukland (*Chow-Chow*), is sacred to Mahadeva, (Siva). In some places in India it is more esteemed than at others. The women bathe in some holy streams with the blossoms floating in it. The Hindoos say that the contact of the stem of the Asoka tree with the foot of a woman of superior beauty, is supposed to make it blossom. This tree is often alluded to

## ASPARAGUS ASCENDENS.

in Select Specimens of the Theatre of the Hindoos, translated by Mr. Wilson. In the 'Toy Cart,' Maitreya says, describing a garden— "And here the Asoka tree with its rich crimson blossom, shines like a young warrior bathed in the sanguine shower of the furious fight. Captain D. L. Richardson, however, (Flowers and Flower Gardens, p. 189), says that the flower is small and yellow, and is eaten by young Hindoo women as a medicine. Voigt says its flowers are of an olive yellow colour.

(177) ASPALATHUS INDICA. Lin.

Shevenar vaymboo, TAM. | Small flowered aspalathus, ENG.  
Shivanimba, SANS.

The small leaves, flowers and tender shoots of this low growing plant, are supposed by the Natives to possess cooling demulcent and alterative properties and are prescribed in decoction in leprous and cancerous affections.

This plant appears to be the Manneli of the Hortus Malabaricus. Rheede tells us, that from the root of it an oil is extracted which is of use in erysipelas.—*Ainslie's Mat. Med.* page 113.

(178) ASPHALT. Dr. Honigberger at p.p. 238 and 239, of his work, writing on the Asphaltum Persicum, Mumiai, Persian—says, that it is a certain specific in fractured bones, deserving the name of Osteocolla. It is a solid, hard, heavy, black, glistening mass without any particular odor. Only the genuine possesses the peculiar properties and is but seldom to be met with even in Persia itself, the place of its origin, for the king of Persia is reported to collect the whole product yearly and to inclose it in small silver boxes, which are distributed as presents to his family and friends. In all Eastern bazars may be found under the name of Persian Mumiai, a compound resembling the genuine in appearance. According to Dr. Seligmann, Mum in Persian, signifies wax, lai or Ajin is the name of the village in the vicinity of which the spring of water containing Mumiai or Mumiajin is found. The Mumiai was discovered in the time of Feridun. He also says that the *Asphaltum Selajit*, *Asphaltum Punjabinum* or Punjab Asphalt, is an officinal article at Lahore, brought from the hills. The Hakims and Hindoo doctors use it instead of the Persian Mumiai in cases occurring from exterior violence.

(179) ASPARAGUS ASCENDENS. Dr. Honigberger, p. 237, says that this product of Hindostan is used only by the natives, who, call it Setaver, or, Sittavair? The stalks, he procured at the bazar at Lahore, were as long as a finger, and as thick as a quill, rather spiral and longitudinally indented, of a horny yellow semi-transparent appearance, of a mucilaginous, sweet and astringent taste. He adds that it is worthy of remark, that the Tamool name of the Pavonia Zeylandica, Sittamoolie or Sittavayr, borders very closely on Sittavair or Setaver.

## ASTRONOMY.

(180) ASPARAGUS. HALLOON. Dr. Honigberger, p. 237, mentions that the seeds so called, are from the common Asparagus, which is cultivated in the North-West of Hindostan. The Hakims use them in debility of the stomach, in liver, spleen and renal disorders; they also attribute to them diuretic and aphrodisiac properties. They believe that the cultivated is more effective than the wild plant.

(181) ASPIDIUM BAROMETZ, the Tartarian lamb, so enthusiastically described by Darwin in his Botanic Garden, has long been celebrated in China. It is partly an artificial production, the ingenuity of Chinese gardeners taking advantage of the natural habits of the plant to form it into a shape resembling a sheep or other object.—*William's Middle Kingdom*, p. 275.

There are several species of Aspidium known in India, the *A. splendens*, and *parasiticum*, described by Mr. Graham, and the *unitum* and *flagelliferum*, in Voigt's Catalogue; and Dr. Hooker mentions that both in Sikkim and Nepal the watery tubers of an *Aspidium* are abundantly eaten.

(182) ASSAFÆTIDA. FERULA ASSAFÆTIDA, Lin. NARTHEX ASSAFÆTIDA, Falconer.

Perungayum, TAM. | Ingoova, TEL.  
Hing, DUK. | Hinga, SANS.

This is used by the Natives of India particularly the Brahmins who from living entirely on vegetable food and milk, require some powerful corrector of acescency, and find nothing that answers the purpose so well as this which is besides cardiac and antispasmodic, and so strongly are they impressed with an idea of its virtues that they think they would die without it.—*Ainslie's Mat. Med.* page 267.

(183) ASSAI, a beverage of Brazil prepared from the *Euterpe edulis*, Mart: a palm which might advantageously be introduced into India.

(184) ASSAMI. An individual a non-proprietor.

(185) ASSAYING, is a branch of chemical analysis, the object of which is to determine the quantity of gold or silver in any mixture with the baser metals.

(186) ASTA, or Patoo, a bast in use in Bheerbhoom.—*Royle Fib. Pl.*

(187) ASTER CHINENSIS. CHINESE STAR FLOWER.

This is very common in Ajmere gardens.—*Genl. Med. Top.* page 206.

It is the *Callistephus chinensis* of DeCandolle. Several species of Aster, however are named by Voigt as having been grown near Calcutta.

(188) ASTRONOMY. The divisions of time, such as they are presented in the Calendar, are composed of days, weeks, months, and years. The modes of determining these divisions, have been various among the nations of antiquity, and



there are still variations in these modes in the modern world.

The manner of reckoning the days by the ancient Jews, and which subsists amongst that people at the present time, is, to commence the day at a certain hour of the evening, and to finish it on the next evening at the same hour. Thus their sabbath begins on the afternoon of Friday, and is completed on the afternoon of Saturday. The Roman Catholic church also commences its festivals in the evening; and this custom is retained amongst ourselves in some of our popular observances, such as the eve of St John, and Christmas eve.

The civil day now commences at 12 o'clock at midnight, and lasts till the same hour of the following night. The civil day is distinguished from the astronomical day, which begins at noon, and is counted up to 24 hours, terminating at the succeeding noon. This mode of reckoning the day, is that used in the Nautical Almanac, and it sometimes leads to mistakes with persons not familiar with this manner of computation: a little consideration will obviate the difficulty. Thus January 10, fifteen hours, in astronomical time, is January 11, 3 in the morning civil time. In France and most of the states of Europe, as with us, the hours are counted up to 12, from midnight till noon, and from noon till midnight. In parts of Italy, and of Germany, the day is held to commence about sunset, and the hours are counted on till the next sunset. This mode is very inconvenient to travellers, as the noon of the "Italian hours" at the summer solstice is 16 o'clock, and 19 o'clock at the winter solstice.

The division of the day among *Mahomedans* is chiefly subservient to the stated times of performing their devotions, and is not generally very accurate. They begin their account at sunset, reckoning twelve hours from thence to sunrise, whether the night be long or short; from sunrise to sunset they also reckon twelve hours, and consequently a night hour is longer in the winter than an hour of the day, and in summer the hours of the day are longer than those of the night. At the equinoxes alone, all the hours are of equal length, and then they coincide with those adopted by us, in commencement and duration, differing, of course, 6 hours in enumeration, so that our six o'clock is their twelve, our seven is their one, &c. At other periods of the year, also, their six o'clock coincides with our twelve, but every other hour differs more or less from ours. The time of sunrise, and, consequently, the length of the day, being known, the length of each hour will be easily found by division, and the period of any given hour determined. Thus, if the sun rise at 7 o'clock, the length of the day will be ten hours (of 60 minutes each) and that of each hour 50 minutes. One o'clock, Mahomedan reckoning, will then

be at 50 minutes after 7, two o'clock 40 minutes after eight, and three o'clock will be half past nine, and so on of the others. When the sun rises at 5 o'clock the three first hours of the day will be completed severally at 10 minutes after six, twenty minutes after seven, and half past eight. In every case six o'clock arrives exactly at midday, which in India is called "*do pahar*, or the *second watch*."

The *Chinese* division of the day is as simple as our own, and not much unlike it. The Chinese begin the day an hour before midnight, and divide the twenty four hours into twelve parts of two hours each. Instead of numbering their hours as we do, they give a different name to each period of two hours; the names and corresponding time, according to our mode, are as follows:—

Tsze..... 11 to 1	Morning.	Woo..... 11 to 1	Afternoon.
Chow... 1 to 3	"	We... .. 1 to 3	"
Yin..... 3 to 5	"	Shin..... 3 to 5	"
Maou .. 5 to 7	"	Yew..... 5 to 7	"
Shin..... 7 to 9	"	Seo..... 7 to 9	"
Sze..... 9 to 11	"	Hae..... 9 to 11	"

The word Keaou is added when the hour of each period is intended, and Ching for the last. Thus, Keaou tsze is 11 at night, and Ching tsze 12 at night; Keaou Chow 1 in the morning, Ching Chow 2 &c. &c. The word K'hieh "quarter," is used after the hour with the numerals yih 1, urh 2, or sau 3, to subdivide the hours into quarters, which is the smallest division commonly employed: example, ching maou yih k'hieh a quarter past 6; keaou woo urh k'hieh, half past 11.

The *Hindoos* and the *Mahomedans* in India, divide the day into four watches, and the night into the same number; the day being considered to extend from sunrise to sunset. The watches are again divided into *ghurees*, which are 24 minutes each in length. As in the summer the days are longer than the nights, each day watch will then be longer than any watch of the night, though, from the necessity of each watch comprising an exact number of ghurees, there will generally be the difference of 1 ghurce between two watches of the same day. There is much variation in this respect, and although, in the latitude of India, the difference is not so great as it would be in a country more towards the north, it is still so inconvenient that the natives of India rarely understand their own method of dividing the day, and readily adopt the English mode.

In order to explain the mode of subdividing the watches, we shall detail the correspondence of ghurees with our hours in March and September, when the days and nights are equal, and when, in consequence, more regularity may be expected than at other seasons. It must be remembered that a ghurce contains 24 minutes, and that 60 ghurees make up the 24 hours; 30 ghurees, therefore, make up the time between

sunrise and sunset at this season. If these 30 ghurees were equally divided between the four watches, giving 7 ghurees and a half to each watch, their correspondence with our hours would be easily made; but as the Hindoo practice is never to divide a ghuree between two watches, but to continue every watch until the last ghuree is completed (with one exception) the watches will be of unequal length: the first and last watches will be of 8 ghurees, and the second and third of 7 ghurees each.

At 6 o'clock, the first ghuree begins with the rising sun and is completed at 24 minutes after 6; the second ghuree strikes at 48 minutes after 6, the third at 12 minutes after 7, and so on in succession until the end of the first watch, at 12 minutes after 9. At 36 minutes after 9, one ghuree strikes again, and the same detail continues until midday, when the second watch ends. The third watch ends at 48 minutes after 2, and the fourth at 6 o'clock, or sunset. The same succession continues during the night.

In the summer, when the sun rises about 12 minutes after five, and sets at 48 after 6, the day is 34 ghurees in length, and the night only 26. In this case the first watch of the day contains 9 ghurees, the second and third 8 each, and the fourth nine. In the night the four watches will contain, respectively 7, 6, 6, and 7 ghurees. In winter, of course the contrary arrangement takes place, the day consisting of 26 ghurees, and the night 34; circumstances being the same in other respects. In the intermediate seasons the watches will contain 6, 7, 8, or 9 ghurees each, according to the length of the day; arranging them so that each watch may contain an equal number of ghurees, if possible; if there be one ghuree in excess, it is to be added to the first watch; if two, to the first and last; and if three, to the first, second, and last. The last ghuree of the day will occasionally be lengthened or shortened, in order to finish the day with sunset, and the last of the night altered in the same way, that the day may begin at sunrise.

With such a variable system as the above, it is evident that no clocks could be made to mark the time; but a mode of denoting time has been adopted by the Hindoos, which is not without ingenuity. They provide a thin metal cup, a clepsydra, through the bottom of which a small hole is drilled; this cup swims on the surface of a vessel of water, until the water, running gradually through the hole, fills the cup, which then sinks. The hole is made of such a size, that the water rising sinks it in 24 minutes. A sort of gong, or shallow bell metal pan, called a ghureeal, is hung up near the vessel, to be struck at the expiration of each ghuree, which is known by the sinking of the cup. A man, who is employed to watch

the sinking of the cup, and to strike on the bell, is called a ghureealee. For the complete establishment of a ghuree, six or eight servants are necessary, who keep watch in turns. Such an expense can, of course, be afforded only by the wealthy; but the sound of a gong is usually loud enough for a whole village, and serves the purpose of a church clock.

We shall explain the operations of the ghureealee through the twelve hours of an equinoctial day; and the process of striking throughout the year will be easily understood from this detail. At six o'clock in the morning, as soon as the sun appears on the horizon, a little cup is put on the surface of the water; when it sinks, which will be at 24 minutes after 6, the time is called, but not struck, 1 ghuree. This ghuree is considered sacred to the sovereign and his ghureealee alone, has the privilege of striking it; with this exception the first ghuree is passed in silence throughout Hindostan. At the second ghuree, two blows are struck; at the third three, and so to the end of the watch, when eight blows are struck for the eight ghuree of the watch: then eight to show that 8 ghurees of the day are passed; and after an interval of a second or two, one loud blow is struck to shew the end of the first watch. The same process is repeated to the end of the second watch, except that the first ghuree is not passed in silence; and that at the end of the watch, which consists of 7 ghurees, after striking the seven blows, fifteen more are sounded, to show that fifteen ghurees are elapsed from sunrise, and then two loud blows to show the end of the second watch. At the end of the third watch, seven blows are struck for the 7 ghurees of the watch, twenty-two for the ghurees of the day, and three loud strokes for the third watch. At sunset, after the eighth stroke for the eight ghurees, thirty are sounded to show that 30 ghurees are passed since sunrise, and four loud ones for the completion of the fourth watch. As the fourth watch is never struck until sunset, the last ghuree will increase with the lengthening days, until in April, it would be equal in length to two ghurees, and the whole watch would contain 9 ghurees. To avoid so long a watch, one ghuree is added to the second watch, which before contained only 7 ghurees, and the last watch is reduced to its former length. In May the day is one ghuree longer, and this addition is made to the third watch, which before contained only seven. The four watches are then of equal length. At the end of May, a ghuree is added to the first watch, and near midsummer another to the last watch. The day then consists of 34 ghurees, and the night of 26 only; and, as the days decrease, 1 ghuree is taken away at a time, in the same order as they were put on, until the shortest day, when the whole detail recommences.

Some variation will occasionally take place



in consequence of the difficulty of ascertaining the precise moment of sunrise, though much less in India than would be the case in a cloudy atmosphere. Change will also arise from the negligence or idleness of the ghurcealee; and tales are sometimes told of great men, for whose convenience the complaisant ghurcealees will add a ghurce to a watch, or accelerate the sinking of the little cup to accommodate their master's pleasure. These circumstances will prevent any exact coincidence of ghurees with hours practically, though there will be no great discrepancy by attending to the rules laid down above.

The English names of the days of the WEEK are derived from the Saxons; and they partly adopted these names from the more civilized nations of antiquity. The following ingenious origin of the ancient names has been suggested in connexion with astronomical science. The planetary arrangement of Ptolemy was thus:—1, Saturn; 2, Jupiter; 3, Mars; 4, the Sun; 5, Venus; 6, Mercury; 7, the Moon. Each of these planets was supposed to preside, successively, over each hour of the 24 of each day, in the order above given. In this way Saturn would preside over the first hour of the first day, Jupiter over the second hour, Mars over the third, the Sun over the fourth, and so on. Thus the Sun presiding over the fourth, eleventh, and eighteenth hours of the first day, would preside over the first hour of the second day, and carrying on the series, the Moon would preside over the first hour of the third day, Mars over the first hour of the fourth day, Mercury over the first hour of the fifth day, Jupiter over the first hour of the sixth day, and Venus over the first hour of the seventh day. Hence, the names of the days yet used in the learned professions throughout Europe. The present English names are derived from the Saxon:—

<i>Latin.</i>	<i>English.</i>	<i>Saxon.</i>
Dies Saturni	Saturday	Saterne's day.
Dies Solis	Sunday	Sun's day.
Dies Lune	Monday	Moon's day.
Dies Martis	Tuesday	Tiw's day.
Dies Mercurii	Wednesday	Woden's day.
Dies Jovis	Thursday	Thor's day.
Dies Veneris	Friday	Friya's day.

Tiw, Woden, Thor, and Friya were deities of the pagan Saxons. Thor was the god of thunder, as well as the ancient Jove, and Friya was a goddess, the wife of Woden.

Almost all nations have regulated their months, in a great degree, by the revolution of the moon. Some have endeavoured to unite this division with the annual course of the sun, by an augmentation of days at the end of each year, or by adding a thirteenth month at the end of every third year. The Jews and the Athenians followed this latter method; the Macedonians, and some nations of Asia, assigned their months 30 and 31 days; the Turks and the Arabs have 29 and 30

verned by the revolutions of the moon. Their common year consisted of twelve lunar months, three months being appropriated to each of the four seasons; but every third year contained an additional lunar month, which was given to the summer season. The names of their lunar months, either had reference to their religious ceremonies, or to the natural appearances of the year.

A considerable variation prevailed, generally, amongst the nations of antiquity, and still partially prevails, with regard to the commencement of the year. The Jews dated the beginning of the sacred year in the month of March; the Athenians in the month of June; the Macedonians on the 24th September; the Christians of Egypt and Ethiopia on the 29th or 30th of August, and the Persians and Armenians on the 11th of August. The Jewish civil year begins on the first day of the month Tisri, which year corresponds with our 9th of September; the Mahomedan's begins on the 1st of the month Moharem, which year, corresponds with our 14th of July. Nearly all the nations of the Christian world now, commence the year on the 1st of January; but as recently as 1752, even in England, the year did not legally and generally commence till the 25th of March. In Scotland, at that period, the year began on the 1st of January. The difference caused great practical inconveniences, and January and February, and part of March, sometimes bore two dates, as we often find in old records, as 1711-12. This practice often leads to chronological mistakes; for instance, we popularly say, "The Revolution of 1688," that great event happening in February of the year 1688, according to the then mode of computation; but if the year were held to begin, as it does now, on the 1st of January, it would be "The Revolution of 1689." In the anniversaries given in the Almanacs, the alterations of style made in 1752, are not followed, as any correction of dates would embarrass the reader in historical and biographical references.

The year, properly so called, is the solar year, or the period of time in which the sun passes through the twelve signs of the Zodiac. The period comprises 365 days, 5 hours, and 48 minutes, 51 seconds, 6 decimals, and is called the astronomical year.

The CALENDAR is a table of the days of the year, arranged to assist the distribution of time, and to indicate remarkable days connected with devotion or business. If every nation had adopted the same division of time, and an uniform calendar had been general throughout civilized states, history would present much fewer difficulties and contradictions. The progress of

great changes in the manner of dividing time; and thus, whilst some nations have been ready to give their calendar every possible advantage of a scientific construction, the prejudices of others have rendered them unwilling to depart from their accustomed mode, however inaccurate. It may be curious and instructive to trace, very briefly, the changes of the calendar, ordinarily called the changes of style.

The Romans called the first days of each month *Calends*, from a word which signified called, because the Pontiffs, on those days, called the people together, to apprise them of the days of festival in that month. Hence we derive the name of Calendar.

The Roman Calendar, which has, in great part, been adopted by almost all nations, is stated to have been introduced by Romulus, the founder of this city. He divided the year into ten months only,—*Mars*, *Aprilis*, *Maius*, *Junius*, *Quintilis*, (afterwards called *Julius*), *Sextilis*, (afterwards called *Augustus*), *September*, *October*, *November* and *December*. *Mars*, *Maius*, *Quintilis*, and *October*, contained 31st days, and each of the six others months 30 days, so that the ten months comprised 304 days. The year of Romulus was, therefore, of 50 days less duration than the lunar year, and of 61 days less than the solar year, and its commencement, of course, did not correspond with any fixed season. Numa Pompilius, corrected this calendar, by adding two months, *Januarius*, and *Februarius*, which he placed before *Mars*. Julius Cæsar, being desirous to render the calendar still more correct, consulted the astronomers of his time, who fixed the solar year as 365 days, 6 hours, comprising, as they thought, the period from one vernal equinox to another. The six hours were set aside, and, at the end of four years, forming a day, the fourth year was made to consist of 366 days. The day thus added, was called *intercalary*, and was added to the month of February, by doubling the 24th of that month, or according to their way of reckoning, the sixth of the *calends* of March. Hence the year was called *bissextile*. This almost perfect arrangement, which was denominated the *Julian style*, prevailed generally throughout the Christian world, till the time of Pope Gregory XIII. The Calendar of Julius Cæsar was defective in this particular, that the solar year, consisting of 365 days, 5 hours, and 49 minutes, and not of 365 days, 6 hours, as was supposed in the time of Julius Cæsar, there was a difference between the apparent year and the real year, of eleven minutes. This difference at the time of Gregory XIII., had amounted to ten entire days, the vernal equinox falling on the 11th instead of the 21st of March, at which period it fell correctly at the time of the Council of Nice, in the year 325. To obviate this inconvenience, Gregory ordained, in 1582, that

the 15th of October should be counted instead of the 5th, for the future; and to prevent the recurrence of this error, it was further determined, that the year beginning a century, should not be *bissextile*, with the exception of the beginning of each fourth century. Thus 1700 and 1800 have not been *bissextile*, nor will 1900 be so, but the year 2000 will be *bissextile*. In this manner, three days are retrenched in four hundred years; because the lapse of the eleven minutes makes three days in about that period. The year of the Calendar is thus made, as nearly as possible, to correspond with the true solar year, and future errors of chronology are avoided.

The adoption of this change, which is called the *Gregorian*, or *New Style*, (the *Julian* being called the *Old Style*), was for some time resisted by states not under the authority of the See of Rome. The change of the style in England was, established by an Act of Parliament passed in 1752. It was then enacted, that the year should commence on the 1st January, instead of March 25th; and that in the year 1752, the days should be numbered as usual until September 24, when the day following should be accounted the 14th of September, omitting 11 days. The *Gregorian* principle of dropping one day in every hundredth year, except the fourth hundredth, was also enacted. The alteration was, for a long time opposed by the prejudices of individuals; and, until lately, with some persons, the *Old Style* was so pertinaciously adhered to, that rents were made payable on the old quarter days, instead of the new. The Russians still retain the *Old Style* thus creating an inconvenience in their public and commercial intercourse with other nations, which, we trust, that the growing intelligence of the people will eventually correct.

During the period in which France was a Republic, the authorities introduced an entire change in the calendar, which was in existence more than twelve years; and is important to be noticed, as all the public acts of the French nation were dated according to this altered style. The National Convention, by a decree of the 5th October 1793, established a new era, which was called, in the place of the Christian era, the *Era of the French*. The commencement of each year, or the first "*Vendémiaire*," was fixed at the midnight commencing the day on which the autumnal equinox fell, as determined at the observatory at Paris. This era commenced on the 22nd of September 1792, being the epoch of the foundation of the Republic; but its establishment was not decreed till the 4th "*Frimaire*" of the year II. (4th November, 1793). Two days afterwards the public acts were thus dated. This Calendar existed till the 10th "*Nivose*," year XIV. (the 31st December, 1805), when the *Gregorian* mode of computation was restored.—*Madras Almanac*, p. 70 to 74.



# AZADIRACHTA INDICA.

English, Mahomedan, Tamil and Hindoo Years.

English.	Fusly.	Aundoo.	Salivaganah.	Names of the Tamil Years be- ing a Cycle of 60 Years.	English.	Fusly.	Aundoo.	Salivaganah.
1747	1157	923	1669	Prabavah . . . . .	1807	1217	983	1729
1748	1158	924	1670	Vebavah . . . . .	1808	1218	984	1730
1749	1159	925	1671	Suoklah . . . . .	1809	1219	985	1731
1750	1160	926	1672	Premodootah . . . . .	1810	1220	986	1732
1751	1161	927	1673	Prejoputtee . . . . .	1811	1221	987	1733
1752	1162	928	1674	Angeersa . . . . .	1812	1222	988	1734
1753	1163	929	1675	Sresmooka . . . . .	1813	1223	989	1735
1754	1164	930	1676	Bavah . . . . .	1814	1224	990	1736
1755	1165	931	1677	Uvah . . . . .	1815	1225	991	1737
1756	1166	932	1678	Dhantoo . . . . .	1816	1226	992	1738
1757	1167	933	1679	Easwarah . . . . .	1817	1227	993	1739
1758	1168	934	1680	Vagodanah . . . . .	1818	1228	994	1740
1759	1169	935	1681	Premaudhee . . . . .	1819	1229	995	1741
1760	1170	936	1682	Veikramah . . . . .	1820	1230	996	1742
1761	1171	937	1683	Vishoo . . . . .	1821	1231	997	1743
1762	1172	938	1684	Chitrabanoo . . . . .	1822	1232	998	1744
1763	1173	939	1685	Soobanoo . . . . .	1823	1233	999	1745
1764	1174	940	1686	Taranag . . . . .	1824	1234	1000	1746
1765	1175	941	1687	Paurtavah . . . . .	1825	1235	1001	1747
1766	1176	942	1688	Viah . . . . .	1826	1236	1002	1748
1767	1177	943	1689	Survajetoo . . . . .	1827	1237	1003	1749
1768	1178	944	1690	Survadaree . . . . .	1828	1238	1004	1750
1769	1179	945	1691	Verokdee . . . . .	1829	1239	1005	1751
1770	1180	946	1692	Vickrootee . . . . .	1830	1240	1006	1752
1771	1181	947	1693	Carah . . . . .	1831	1241	1007	1753
1772	1182	948	1694	Nundanah . . . . .	1832	1242	1008	1754
1773	1183	949	1695	Vejia . . . . .	1833	1243	1009	1755
1774	1184	950	1696	Jia . . . . .	1834	1244	1010	1756
1775	1185	951	1697	Mnmada . . . . .	1835	1245	1011	1757
1776	1186	952	1698	Deonmooke . . . . .	1836	1246	1012	1758
1777	1187	953	1699	Avelumbee . . . . .	1837	1247	1013	1759
1778	1188	954	1700	Velnabee . . . . .	1838	1248	1014	1760
1779	1189	955	1701	Vekauree . . . . .	1839	1249	1015	1761
1780	1190	956	1702	Sharvaree . . . . .	1840	1250	1016	1762
1781	1191	957	1703	Pelavah . . . . .	1841	1251	1017	1763
1782	1192	958	1704	Soobacroote . . . . .	1842	1252	1018	1764
1783	1193	959	1705	Sobacroote . . . . .	1843	1253	1019	1765
1784	1194	960	1706	Crodhee . . . . .	1844	1254	1020	1766
1785	1195	961	1707	Visvavasoo . . . . .	1845	1255	1021	1767
1786	1196	962	1708	Parabava . . . . .	1846	1256	1022	1768
1787	1197	963	1709	Pelvarunga . . . . .	1847	1257	1023	1769
1788	1198	964	1710	Keelakah . . . . .	1848	1258	1024	1770
1789	1199	965	1711	Soammia . . . . .	1849	1259	1025	1771
1790	1200	966	1712	Saudaranah . . . . .	1850	1260	1026	1772
1791	1201	967	1713	Verodookroote . . . . .	1851	1261	1027	1773
1792	1202	968	1714	Pareedupee . . . . .	1852	1262	1028	1774
1793	1203	969	1715	Premadeeha . . . . .	1853	1263	1029	1775
1794	1204	970	1716	Anunda . . . . .	1854	1264	1030	1776
1795	1205	971	1717	Rautchasa . . . . .	1855	1265	1031	1777
1796	1206	972	1718	Kaleh . . . . .	1856	1266	1032	1778
1797	1207	973	1719	Pingalah . . . . .	1857	1267	1033	1779
1798	1208	974	1720	Caulayuktee . . . . .	1858	1268	1034	1780
1799	1209	975	1721	Siddartee . . . . .	1859	1269	1035	1781
1800	1210	976	1722	Rondree . . . . .	1860	1270	1036	1782
1801	1211	977	1723	Doonmatee . . . . .	1861	1271	1037	1783
1802	1212	978	1724	Doondoobee . . . . .	1862	1272	1038	1784
1803	1213	979	1725	Roodrogauree . . . . .	1863	1273	1039	1785
1804	1214	980	1726	Ructauche . . . . .	1864	1274	1040	1786
1805	1215	981	1727	Crodanah . . . . .	1865	1275	1041	1787
1806	1216	982	1728	Utchia . . . . .	1866	1276	1042	1788

(189) AZADIRACHTA INDICA, Margosa Tree.

Nat. Ord. Meliaceæ, Linn. Syst. Decandria, Monogynia; Azadirachta Indica Ad. de. Jussieu in Mem. Mus. 19 tab. 13. Wight and Arnott.

# AZADIRACHTA INDICA.

Prod. Vol. I. P. 118, Wight Icones, Vol. I. tab. vi., O'Shaughnessy Beng Dis P. 244, Graham Cat. Bombay, Pl. P. 30. Voigt Hort. Calcut. P. 133. Melia Azadirachta Linnaeus, Spec. Plant, P. 550, Flor Zeylan, P. 101, D. C. Prod. Vol. I, P. 622. Roxburgh Flor. Ind. Vol. II. Page 394. Roth Nov. Spec. Pl. P. 215. Sprengel Syst. Vog. Vol. III. P. 67. Burman Flor. Ind. P. 101, Ainslie Mat. Ind. Vol. 2, P. 453. Azedarach foliis falcata servatis Burman Thes. Zeylan, P. 40 tab. 15. Olea Malabirica, fraxini folis Pluk. Almag. P. 269, tab. 247. Ariabepon Rheede Hort. Malab, Vol. IV, P. 107 tab. 52, Calyx 5, partite, Petals 5 patent: Anthers 10 on the throat of the stamen tube, short ten lobed lobes reflexed, anthers opposite to the lobes and about equal to them, oblong ovary seated on a short disk 3 celled ovules 2 in each cell collateral pendulous style, columnar stigma 3 partite the lobes conical, Fruit drupaceous by abortion celled 1 seeded. Leaves simply pinnated. Leaflets unequal sided glabrous servated panicles axillary number of parts of flower occasionally decreased by a fifth. A middling sized tree (20 feet) flowering in the hot season, it differs from all the other species in having a one celled, one seeded nut though the germ has uniformly five cells with one or two ovula in each (Roxburgh O. C.) It is found more or less abundantly in all parts of the Peninsula of India. It has also been observed in Ceylon, Ava, the Tenasserim Provinces, Java, &c. In the latter places as in Burmah it is chiefly cultivated for its medicinal properties.—Mason.

Its Eastern synonyms are :—

Nimba, SANS.	Vapa or Vapum Maunoo
Nimb, ARAB.	TEL.
Durukht-i-azad, PERS.	Vaympa, TEL.
Neeb Nimb, Neem Hind.	Kohomba, CYNG.
BENG.	Shembau, KAMA.
Bey Vurmah Bewa, CAN.	Kha, BURM.
Wepp, MAL.	Imbo, JAVAN.
Vaypum, marum, TAM.	Tsamehoo Fooleen, CHIN.

The Azadirachta Indica is very common in India. Every part of this tree, especially the bark, is bitter. The bark is also astringent; the leaves are very bitter and nauseous; from the ripe pericarp of the fruit a bitter fixed oil is expressed. Mr. Piddington believes that he has obtained the bitter principle in a crystallised form. But the properties of this tree are imperfectly determined.

The bark is considered by native practitioners as among their most valuable tonics, and is given with aromatics in fever. Dr. White of Bombay used the bark as a febrifuge and almost with the same effect as Cinchona. The Madras Report considers it superior to Rohun bark.

Jadubehunder Sett of Bareilly reports finding extract of neem bark very useful in the treat-

## BALACHIAN.

ment of ague. It is certainly a substance well adapted for use in Dispensaries.

It has been given both in decoction and in extract.—*Ind. Ann. Med. Sc. for April 1856 p. 393.*

(190) AZALEA. Species of this plant are repeatedly noticed by Mr. Fortune. At one place, he says that the *Murraya exotica*, *Aglaia odorata*, *Ixoras*, and *Lagerstroemias* are very ornamental in autumn. Of the Azaleas, the principal kinds grown were *Azalea indica*, *alba*, *phœnicea*, *lateritia*, *variegata*, and the yellow *Azalea sinensis*. He found the latter plant wild on the Ningpo hills, so that there is no doubt of its being a genuine Chinese species. The air at one season around Fa-tee is perfumed with the sweet flowers of *Olea fragrans*, and the *Magnolia fuscata*, both of which are grown extensively in their gardens.—*Fortune's Wanderings, page 153.*

*Azalea ovata* Lindl., he says, is certainly one of the finest and most distinct plants of this kind which he has introduced, and it also grows wild on the hills, and was in full bloom at this period.—*Page 317.*

At one place he found several species of *Azalea* covering the sides of the hills at least fifteen hundred feet above the level of the sea.—*Page 21 & 22.*

He says also *Azaleas* abound on the hill sides of this island. Most people have seen and admired the beautiful azaleas which are brought to the Chiswick fetes, and which, as individual specimens, surpass in most instances those which grow and bloom on their native hills, but few can form any idea of the gorgeous and striking beauty of these azalea-clad mountains, where, on every side, as far as our vision extends, the eye rests on masses of flowers of dazzling brightness and surpassing beauty. Nor is it the azalea alone which claims our admiration; clematises, wild roses, honey suckles, the *Glycine*, and

## BAMBOO.

a hundred others, mingle their flowers with them, and make us confess that China is indeed the "central flowery land." There were several species of myrtaceous and ericaceous plants, which are also common on the hills, but no species of heath has ever been found, and he believes the genus does not exist in this part of the country.—*Fortune's Wanderings, p. 67.*

At a subsequent visit, he found in the hedges the last fading blossoms of the beautiful spring-flowering *Forsythia viridissima* still hanging on the bushes, while several species of wild roses, *Spiræa Reevesiana*, clematises, and *Glycine sinensis*, were just coming into bloom. But higher up, on the gorgeously painted hill-side, were masses of yellow and white flowers. The yellow, was the lovely *Azalea sinensis*, with its colours far more brilliant, and its trusses of flowers much larger, than they are ever seen in any exhibition in Europe. The white was the little known *Amelanchier racemosa*. Amongst these and scattered over the hill sides, were other azaleas having flowers of many different hues, and all very beautiful.—*A Residence among the Chinese, p. 27.*

(191) AZAN, *Arab.* The Mahomedan summons to prayer, proclaimed by the Moazzan: the words used, some of which are repeated, mean God is Great, I bear witness there is no other god but God, and I bear witness that Mahomed is indeed the prophet of God. Come enliven your prayers. Come for refuge to the asylum. God is great. There is no god but the true God.—*Herkl.*

(192) AZURE STONE or lapis lazuli is said to be found massive with iron pyrites, amongst the Ajmeer hills, especially the Nag-puhar range: this stone is sold by all "attars" both as a medicine and as a pigment: though found in the district, it is also imported into Ajmeer from Bombay: the native name, in Ajmere, is "laj-burd."—*Genl. Med. Top. p. 162.*

## B.

(193) BALACHIAN. Is a condiment prepared from small fishes of all descriptions and shell fish. The ingredients are placed in a pit to undergo fermentation, and afterwards dried, pounded and preserved with spices. With the Malays, Siamese, Burmese and Cochin Chinese, Balachian has become a necessary of life, as it serves to season the daily food of these nations.

According to Ainslie, Blachang or Balachang, is a sort of a caviare of a very strong odour, prepared with the spawns of shrimps, and shrimps themselves on Sumatra and other Eastern islands whence it was brought to India, in his time; but it is not now known on the coast side.—*Ainslie's Mat. Med. p. 144.*

(194) BAMBOO. The roots are carved into fantastic images of men, birds, monkeys, or monstrous perversions of animated nature, cut into lantern handles and canes, or turned into oval sticks for worshippers to divine whether the gods will hear or refuse their petitions. The tapering culms are used for all purposes that poles can be applied to carrying, supporting, propelling, and measuring, by the porter, the carpenter and the boatman; for the joists of houses and the ribs of sails, the shafts of spears and the wattles of hurdles; the tubes of aqueducts, and the handles and the ribs of umbrellas and fans.

The leaves are sewed upon cords to make rain cloaks, swept into heaps to form manure, and



## BAMBUSA ARUNDINACEA.

matted into thatches to cover houses. Cut into splinths and slivers of various sizes, the wood is worked into baskets and trays of every form and fancy, twisted into cables, plaited into awnings and woven into mats for scenery of the theatre, the roofs of boats, and the casing of goods. The shavings even are picked into oakum and mixed with those of rattan to be stuffed into mattresses. The bamboo furnishes the bed for sleeping and the couch for reclining, the chopsticks for eating, the pipe for smoking and the flute for entertaining, a curtain to hang before the door and a broom to sweep around it; together with screens, stools, stands, and sofas for various uses of convenience and luxury in the house. The mattress to lie upon, the chair to sit upon, the table to dine from, food to eat, and fuel to cook it with, are alike derived from it, the ferule to govern the scholar, and the book he studies both originate here. The tapering barrels of the tong or organ and the dreaded instrument of the doctor—one to make harmony and the other to strike dread, the skewer to pin the hair and the hat to screen the head, the paper to write on, the pencil handle to write with and the cup to hold the pencil, the rule to measure lengths, the cup to gauge quantities and the bucket to draw water, the bellows to blow the fire, and the bottle to retain the match, the bird-cage and crab-net, the fish-pole and sumpitan, the water wheel and aqueduct, wheelbarrow and hand cart &c. &c. are one and all furnished or completed by this magnificent grass, whose graceful beauty when growing is comparable to its varied usefulness when cut down.—*Williams' Mid. Kingdom*, page 277.

(195) BAMBUSA Sp. See Mow-Chok C. of J.

(196) BAMBUSA ARUNDINACEA. Roxb.

### *The plant.*

Bans, BENG. | Mungil or Munkil, TAM.  
Mulka, Vedroo, TEL.

It delights in a rich moist soil, as the banks of rivulets, lakes &c. among the mountains.—*Roxb. page 191.*

The Tamul medical practitioners say the root is diluent; that the bark cures eruptions; the leaves are esteemed emmenagogue and that the tabasheer, which is found in the old cavities of the joints of this species, is useful in paralysis and flatulence. The seed is used for food.—*Roxb. page 192.*

### *The young plant.*

Moonghill koortoo, TAM. | Vedoorookoortoo, TEL.  
Bas ke kaonlie sakh. DUK,

Moonghill koortoo is the Tamool name of young Bamboo plants, when they have risen but a few inches from the ground. The Natives prepare with them a very pleasant tasted pickle.

## BANYAN.

### *The seed.*

Moonghill arisee, TAM. Vedooroo Beeum, TEL.  
Bans ke chawul, TEL. Vanoo, SANS.

This is generally eaten boiled with milk; or with animal food, spices, salt and water, it is made into broth.—*Ainslie, page 219.*

(197) BAMBUSA BALCOOA. Roxb. There are two varieties, the Balkoo-bans, Bengal, also Dhooli-Balkoo. The former variety has a smaller cavity, and on account of its size and strength is reckoned the best for building purposes, scaffolding &c.—*Roxb. Vol. II. page 196.*

(198) BAMBUSA BACCIFERA.

Beesha, TAM. | Pagutulla, CHITTAGONG.

Is indigenous in the Chittagong mountains. It bears a berry, one seeded and yields tabasheer.—*Roxb.*

(199) BAMBUSA NANA.

Ken-fa, CHINESE.

A native of China, but introduced into Calcutta. It makes most beautiful hedges.—*Roxb.*

(200) BAMBUSA SPINOSA.

Behorbaus, BENG.

Is found in the vicinity of Calcutta. It is strong and is employed for various useful purposes.—*Roxb. p. 199.*

(201) BAMBUSA STRICTA.

Sadanapa Vedroo, TEL.

Grows in dry situations, and used as spear shafts.—*Roxb. Vol. II. p. 193.* *Bambusa Stricta* of Behar, is of a green colour, and is unlike the other species of this genus, all of which are yellow or white.—*Hooker. Vol. I. p. 30.*

(202) BAMBUSA TULDA.

Tulda-baus, BENG. | Peka-baus, HIND.

This is the common bamboo of Bengal, where it grows in the greatest abundance. It flowers in May. Its varieties are the *Jowa-baus*; the Basini-baus, employed in basket making and the Behoor-baus of the Bengalees. A staff of the Behoor-baus must be placed in the hand of every young Brahmin, when invested with the sacerdotal cord.—*Roxb. Vol. II. p. 196.*

(203) BANYAN. Lady Faulkland tells us that about eight miles from Wacee is a banyan tree, covering a space of ground between three and four acres. The road to it is along the valley. Under this magnificent tree, she says, I remained some hours. The shade was so complete, I could sit in the middle of the day without any covering on my head.

The tree was of such a size that separate picnic parties might take place under it, and not interfere with each other. There were countless avenues, or rather aisles, like those of a church, the pale-gray stems being the columns, which, as the sun fell on them, glittered in parts like silver; and here and there were little recesses like chancels.

## BARLERIA PRIONITIS.

where the roots from the boughs formed themselves into delicate clustering pillars, up and down which little squirrels were chasing each other; while large monkeys were jumping from bough to bough, the boughs cracking and creaking, as if both monkeys and boughs would fall on my head. There are many banyan trees, of great size, in this part of India; but I have never heard or read of any larger, or more perfect, than this. The exact area shaded by it at noon-day is, by careful measurement, three acres and three-quarters. The space covered is a very symmetrical oval. There is no brushwood underneath, nor anything to interrupt the view, except the numerous stems of the tree itself. The tree is so regular in its external shape, as to take off in some degree, from its beauty, it looks, at a little distance, like a closely-planted clump of trees, or a gigantic green mushroom; but in every other respect, seen from underneath, it is beautiful, whether in the heat of noon-day, or in the dark night, when the servants and camp-followers have lighted their watch-fires in its lofty aisles; or, perhaps, most of all, when a bright moon-light struggles through some of the few openings in the leafy canopy. I really did not wonder at its being regarded by the simple villagers as a deity; and many were the marvels they related of the punishments inflicted on those who had violated its sanctity. One story runs that an impious Soobadar, who ruled the district in former days, having more regard for his own comfort than for the sacred tree, caused two of the descending shoots or roots, or whatever the pendulous boughs should be called, to be cut as poles for his palanquin. But he was so terrified by a frightful vision of the tree-goddess, who appeared to him the first time he reclined in the palanquin, that he made large offerings to her, to atone for his act of sacrilege, and placed the poles he had impiously cut in the little village temple hard by, where they still are to be seen.—*Chow-Chow*, p. 206.

(204) BARK STRINGS, and BARK ROPES, are made from fibres by the Hill tribes of Rajmahal.—*Royle*.

(205) BARLERIA LONGIFOLIA. Lin.

*The root.*

Neer moollie vayr, TAM. | Neer goobbie vayroo, TEL.  
Gooshura, HIND. | Hchoora, SANS.

This, the root of the long leaved Barleria, has got its Tamool name from being generally found growing in moist situations. It is supposed to have virtues similar to the Moollie vayr.—*Ainslie's Mat. Med.* p. 39.

(206) BARLERIA PRIONITIS. Lin.

Shemmoollie elley, TAM. | Moollooghoruntch, TEL.  
TAM. | Kooruntaka, SANS.

## BASSIA LONGIFOLIA.

The juice of this leaf which is slightly bitter, and rather pleasant to the taste, is a favorite medicine of the Tamool practitioners, in those catarrhal affections of children which are accompanied with fever and much viscid phlegm: it is generally administered in a little honey, or sugar and water.—*Ainslie's Mat. Med.* p. 111.

(207) BARARM RIVER. The Barram river is situated about 80 miles south of Labuan.

(208) BARRINGTONIA ACUTANGULA.

Jsjeria Samustranadi, | Ijul, Hijul, BENG.  
TAM. | Cademie, TEL.

This species is common in most parts of India, it grows to be a large handsome tree; in appearance it is like a well shaped, regular middle sized oak—it flowers about the beginning of the wet season, its long pendulous racemes of scarlet coloured flowers give it at that time a most elegant appearance.—*Roxb. Rohde. M.S.S.*

This tree grows in the north west provinces of Hindostan, principally about Saharunpore. The seeds are officinal and used by the Indian doctors.—*Dr. Honigberger*, p. 241.

(209) BARRINGTONIA RACEMOSA.

A stout timber tree, a native of the Malacca islands, the Delta of the Ganges, Malabar &c.—*Roxb.*

(210) BASELLA ALBA. Lin.

Codipessaci, keeray TAM. | Tinghe Batsalikoora, TEL.  
Bayl ke butchla ke baujee, | Kolumbi, SANS.  
Duk. | —*Ainslie*, p. 253.

(211) BASSIA LONGIFOLIA, Lin.

*Eloopiemarum*, TAM.

Long leaved Bassia tree. According to Ainslie, this is reckoned a useful wood in house building, and for making doors, windows, &c. &c.—*Ainslie's Mat. Med.* p. 209.

*The oil.*

Eloopei umay, TAM. | Ippa noonay, TEL.  
Mohe ka tail, DUK.

This is an expressed oil obtained from the olive shaped seeds of the five celled fruit of the Bassia longifolia. It is used by the common people not only as a substitute for ghee but for burning in lamps.—*Ainslie's Mat. Med.* p. 263.

*The tree.*

Ippa, TEL. | Mooa, BENG.  
Ilupi, TAM. | Tchnee, CYNG.  
Ipie, CAN.

This is a native of the Peninsula of India and found in plantations along the southern part of the coast of Coromandel. It flowers during the hot season in the month of May, the seed ripens in August and September.

The following were given as the economical uses of the Ilupie tree. Bassia longifolia, by the Rev. Dr. John of Tranquebar.



## BAST OR NAR.

1. The oil pressed from the ripe fruit is used by the Natives as common lamp oil.

2. It is a principal ingredient in making the country soap and keeps therefore often the same price with the cocoanut oil.

3. It is to the common people a substitute in place of ghee and cocoanut oil in their curries and other dishes. They make cakes of it, and many of the poor get their livelihood by selling these sweet oil cakes.

4. It is used to heal different out breakings, such as the itch &c.

5. The cake left after the oil is expressed is used for washing the head, and is carried as a small article of trade to those countries where these trees are not to be found.

6. The flowers which fall in May are gathered by the common people, dried in the sun, roasted and eaten as food. They are also bruised and boiled to a jelly and made into small balls, which are sold or exchanged for fish, rice, and various sorts of small grain.

7. The skin is taken off from the ripe fruit as well as the unripe, and after throwing away the unripe kernel boiled to a jelly and eaten with salt and capsicum.

8. The leaves are boiled with water and given as a medicine in several diseases to both men and cattle.

9. The milk of the green fruit and of the tender bark is given also as a medicine.

10. The bark is used to cure the itch.

11. The wood is as hard and durable as teak wood but not so easily worked, nor is it procurable of such a length for beams and planks, except on clay ground where it grows to a considerable height, but in such a soil does not produce so many branches and is less fruitful than when in a sandy or mixed soil which is the best for it. In a sandy soil the branches shoot out near to the ground to a great circumference, and give more fruit. These trees require but a little attention and watering during the first two or three years in the dry season and being of so great use there should be plantations of them on high and sandy grounds, where no other fruit tree will grow.—*Rohde M.S.S.*

(212) BAST OR NAR, from the large Australian or rather Cape tree (*acacia robusta*) so common on the Neilgherries. In January 1854 Mr. McIvor first used this bast and it has since been in use in the gardens for all purposes to which Russian bast is applied in gardens in Europe. The material is strong, tough, and durable also pliable when wetted; No. 1 Specimen of the bark as taken off the tree; No. 2 prepared for tying plants. No. 3 for twisting into rope. This bast could be procured cheaply and in large quantities, as the roots when the trees are cut

## BAUHINIA VARIEGATA.

down throw up numerous young shoots to the height of from 6 to 12 feet in one year. The bark of this tree is also a powerful tan.—*Mr. McIvor.*

(213) BATAVIA. The ancient Jakatra, situated on the banks of the large river Tji-li-wung, in Java, has always been the capital of the Dutch possessions there. According to M. Temminck, the population in 1832, was nearly 118,000, as follows:—

Europeans.	2,800	Moors and Arabs.	1,000
Chinese....	25,000	Slaves.....	9,500
Natives....	80,000	Total...	118,000

No. 3, *Jour. Ind. Arch.*

(214) BAUHINIA PARVIFLORA. ARI NARA.

Archa maram, TAM.

A small uncommonly crooked bushy tree a native of most forests on the coast of Coromandel, the bark furnishes the matchlockmen with their matches, *Jauiki tadoo*; it burns long slowly without the help of Saltpetre or any other combustible: to prepare the bark it is boiled, dried and beat. Ropes are also made of the inner rind which is fibrous strong and durable.—*Rohde, M.S.S.*

(215) BAUHINIA DIPHYLLA, one of the most common of barks is the *Bauhinia diphylla*, called Authee nar, Yepy, and Apa. This is a strong coarse brown bark of which the Natives make temporary ropes for securing thatch, matting or fences. The barks of several other Bauhinias are used for the same purposes. The Ara nar is the bark of the *Bauhinia parvifolia*, of which matches for native guns are made.

(216) BAUHINIA TOMENTOSA. Lin. DOWNY MOUNTAIN EBONY.

Caat Attie poo, TAM. | Usmadugha, SANS.

The small dried buds and young flowers of this species of Bauhinia, which is the Canschena puu of the Hort. Mal., the Native practitioners prescribe in certain flux cases; they have little sensible taste or smell, though the leaves of the plant when fresh and bruised, have a strong but not unpleasant, odour. Rheede tells us in the H.'s M.'s (Part 1. p. 64) that a decoction of the root of the bark is given on the Malabar Coast, in cases where the liver is inflamed.—*Ainslie's Mat. Med. p. 73.*

(217) BAUHINIA VAHLII, is a tree which grows in the north-west provinces of India, near the mountains. The kernels of the large and broad pods have a sweet astringent flavor, and are eaten like almonds by the natives. When the husks are fresh the natives roast them to get at the kernels, when old, they open of themselves: it is said the kernels possess tonic and aphrodisiac properties.—*Dr. Honigberger, p. 241.*

(218) BAUHINIA VARIEGATA. Its buds are sold fresh in the bazar at Lahore as a vegetable, which are eaten prepared with animal food.—*Dr. Honigberger, p. 241.*

(219) BAWEAN. The Island of Bawean, or following its old name Lubek, forming a portion of the Residency of Sourabaya, lies about sixteen Dutch (forty-eight English) miles to the north of Ujong Pangka, in  $5^{\circ} 30'$  South latitude and  $112^{\circ} 38'$  W. longitude (Greenwich) and contains about 36 square (Dutch) geographical miles or 44 English miles.

The country in general is very mountainous, and it is only near the sea that some plains are found, on the largest of which, about  $3\frac{1}{2}$  miles in circumference, the principal village Sangkapura is situated.

The highest mountains which present themselves on the Island are the Gunong Tingi and Gunong Rajah, the height of which differs little from each other and may amount to 2,000 feet above the level of the sea.

There we have a most impressive panorama over the whole Island. The thermometer shewed at midday  $75^{\circ}$ ; the air is fine, but at the same time humid.

The ground of Bawean, which bears all the marks of volcanic origin, is fertile, being adapted not only for the cultivation of rice, but also for that of cotton, indigo, and tobacco.

The ground also furnishes coal, which is found in the vicinity of the dessa Kalompe, and if search were made for it, it would possibly be found in other parts.

In the vicinity of the same dessa the naturalist Diard, at the time of his visit to this place in the year 1840, found a kind of white sand eminently adapted for covering melting furnaces. Several cargoes of it have already been exported for the arsenal at Sourabaya, as well as by private individuals, and it has been proved by trial that it is of superior quality to the sand brought from Europe for the same purpose.

Although warm springs are found, they appear to contain only a little sulphur, but to have a large measure of alum. There are dispersed over the whole island, being found as well in the vicinity of the dessa Kepoog on the east coast and around the dessa Gellam in the west, as in the vicinity of the capital. The hottest has a temperature of  $125^{\circ}$  Fahr. These springs, of which the water has much resemblance to Seltzer water, are generally very efficacious in cutaneous diseases, and they are therefore used in the good effect by the inhabitants when such disorders occur.

There is little dense jungle. The *Champlong* alone not only attains a thickness unknown in Java but is also finer, and when made into furniture, is scarcely distinguishable from the *Kaya Ambailo*. In the country around the dessa Gellam, the *Kaya Puti* tree occurs in great abundance; but owing to the inhabitants of Bawean not knowing how to extract the well known oil the leaves and fruit only are used as medicine. Although in former years

thick *Jati* wood was found it has now entirely disappeared; the whole island having become divested of it from the inhabitants having cut it down for the building of prahus and houses; so that it has now to be imported from Java. The *Kayu Sona* which was found in great abundance, has met with a similar fate. The brushwood with which all the mountains are covered is only fit for fire-wood. Some shrubs are also found which do not occur in Java; amongst other the *Kayu Anyang*, the fruit of which sells in Java at 30 florins per picul, and a number of wild flowers which have a very beautiful appearance. The so called ivy in particular varies very much in its kinds.

We miss many of the fruits which are cultivated on Java. There are only found different kinds of mango, pisang, the blimbing, the pomplemos, and some durian trees. A fruit known under the name of *bua Kayu pait*, which so far as is known does not exist in Java, is here found in abundance, particularly in the country around Sungie Trus. The tree reaches a height of 30 feet, and presents a beautiful appearance when it is covered with fruit. The fruit is in bunches of a deep red colour, is milky, of an agreeable flavour, and has some resemblance to the *Sawo* fruit.

The inhabitants for the most part use *cachang*, or for want of it, *jarak* oil.

The pinang tree is extensively cultivated, principally in the country surrounding the dessas Sukela, Dissallan and Kalompe, so that there is a large export of it, amounting annually to about 3,000,000. The *aren (gomute)* tree is in great abundance; and besides furnishing the inhabitants with the refreshing sap of which they are very fond, gives 40 to 50 picul of aren sugar for exportation. We also meet in tolerable abundance the proper Amboyna sago tree of which the sago is excellent, and of which the natives make use after the planting of the paddy. The greatest quantity is found in the country around the dessa Talook-dalem.

After the paddy harvest the sawas are made over to any one for the cultivation of vegetables amongst which are the *Katella*, *bintool*, *Kaladie*, and a very little *jagong*, including the so called *Jagong-kodok* which only requires to be two months in the field before it is cut, and which yields a small grain and at the highest reaches a length of 4 or 5 inches.

On the other hand there are numerous and very large monkeys. There is perhaps no island in the Archipelago so abundantly furnished with these troublesome and even hurtful animals. They are not malicious but beyond measure forward, so that they frequently oblige those who live in isolated places to remove their dwellings.

In the year 1844, in the month of July, says this writer, when making my ordinary round, I



had one day just dismounted from horseback to follow a couple of deer which had shown themselves on the road, when I observed a family of apes who had taken possession of a solitary Javanese dwelling, shaded by fruit trees and bambus, the inhabitants of which, with the exception of an old woman, were absent. The apes had entirely gutted it, although the old woman was beating round with a bambu, and four children who were playing in the vicinity kept up a clamour. They were just ready to seize a copper pot full of rice when two well directed shots put a stop to this scene. Of the spoil taken by them very little was recovered. The old woman died shortly afterwards from the fright. The *tengalong* or so called civet cat is extremely large, lives in a very solitary manner, and is in much request on Java for his excellent qualities. The *límak* is also found here, but in small number. The porcupine is also found, and is somewhat larger than on Java. Besides the water snakes, of which different varieties are found, there exist also the *ular wellang*, *ular sawa*, the *ular luwook*, the *ular biren*, and the *ular pendjallin*. The first named is alone dangerous from its poisonous bite. It is principally when young that its poison is so noxious. Instances have occurred of men who have been bitten dying in a few seconds. Leeches are totally wanting, Scorpions and caterpillars are abundant. The alligator is seldom or never found, but on the other hand there are many guanos which inhabit all parts of the island. Lizards are found of different kinds.

Besides the *byo*, the large white and blue wood pigeon is met here, the first known in Java under the name of *kadanchar*, and on Banda under that of the nutcracker, the last, of the same genus, is somewhat smaller; they are here called, the first *Burong Berrom*, the second *Kudawa*. The lovely green pigeon also frequents the vallies but in small numbers.

The celebrated and palatable fish called *bandeng*, which has the most resemblance to our salmon, does not breed here as in Grisse, because there are no fish ponds. It is never caught in the sea, notwithstanding at the change of the east and west monsoon, the coast is yearly visited by Madurese fishers who come to catch the young *bandeng* for the fish ponds, and who sell them at Grisse the redan of 5,500 small fish for 18 rupees and more.

The island is divided in three districts, viz. Sankapura, Kulon Negerie and Wettan Negerie. Sankapura consists of a union of 17 campongs which constitute the head station, and contains a circumference of  $3\frac{1}{2}$  miles. Sankapura has a population of 6,770 souls.

*Kulon Negerie* has 26 dessas, with a population of 11,826 souls and 2,881 houses. Under its jurisdiction is found the Birds nest rock Nusa,

ance from the nests found in it, which are rented by government, but the traveller will not repent visiting it. The circumference is 80 feet, height 50, and the beautiful cave which has been formed in it by nature has a circumference of 55 feet and is about 18 feet high. Notwithstanding the raging surf which breaks against the cliff, the water within, which has a depth of  $1\frac{1}{2}$  fathoms, is in a dead calm; and superb is the sight from within this cave as we see the foaming waves breaking themselves against the steep rocks and flowing calmly in. The summit of this rock is covered with sea grass, and numerous sea mews have chosen this place to lay their eggs.

In the neighbourhood of the dessa *Patter* we find a subterranean gallery (called *Gowa*) the depth of which is not known by the natives, probably on account of their belief that it is filled with serpents which appeared in human form, and in consequence being considered as holy, receives many pilgrimages. This popular legend and superstition however was destroyed, to the vexation of many hajis, in the month of July 1844, when he visited the cave in company with Mr. J. A. Jacobs and some chiefs, and measured it exactly. The depth was found to be about 200 fathoms. He had it is true much opposition from bats and were several times left in utter darkness by the torches being extinguished, but his trouble was recompensed, for he doubts whether there is a more beautiful subterranean cave to be found in the whole Archipelago.

About 3 miles to the north of this cave there is a very romantic waterfall about 70 feet high, the water of which forms the river of Sungi-toppo, which waters many paddy fields. It is remarkable that the bay of Promahan situated in this part, is the richest in fish of the whole island and above all abounds in the so much prized *bandeng*, *blanak* and *ikan kembong*, which are scarcely found in the other bays. Once or twice in the month, according as the water and wind serves, this fine bay is fished, which is done with the *krakat*, a kind of dragnet about a hundred fathoms long, and it not unfrequently happens a haul yields 1,000 and more fishes, amongst which *bandeng* are chiefly found,  $2\frac{1}{2}$  feet long and 8 inches broad, and a great number of *kembongs*.

The Baweans, probably descendants of the Madurese, whose language with a few modifications prevails, differ from them in dress; but in this respect agree closely with the Bugis. The inhabitants of the dessa *Dipanga* employ the Javanese language.

The principal articles of export are, first, mat-work, consisting of sleeping, couch and chair-mats, rice baskets and siri boxes. The plant called *pandang*, which is arranged into three kinds and which has much resemblance to the above, furnishes the principal material of this branch of

abundance. The first kind, which gives the largest leaves, is used in the preparation of couch and sleeping mats, the second, having a leaf of medium length, for a smaller kind of sleeping and chair mats, the third is only used in the plaiting of siri and tobacco boxes. After being cut the prickly border of the leaf is removed by means of a horse hair, after which it is divided in proportion to the coarseness or fineness of the matting, next made smooth by means of a round piece of wood which runs between the fingers, and last being boiled is placed in running water in order to stretch it. After having been dried in the wind and acquired a glistening white colour it is fit for use. The manipulation with the plaiting which follows is entirely done by women, who employ themselves with it in *duroongs*, before their houses. The *duroongs*, about which the respectable Baweans make more work than about their houses, are not infrequently 20 feet long and 10 feet broad, and have a value of 80 or 90 \$ dollars. They are the same as what the Javanese call *limboong*, but with this difference, that in the *duroong* the paddy is stored above, while the lower part is used for the weaving of cloth and the plaiting of mats. In feasts also the food is eaten there. Of the kind of mats that have been mentioned about 180,000 to 200,000 are annually exported to Java and other places, having a value of about 60,000 guilders. There is also a considerable trade in mill stones, stone mortars and clothes. The first two articles are chiefly prepared in the dessa Tellock dalem, and the last are woven by the women in the absence of the men—the requisite thread being imported from Joana—and are mostly destined for the retail trade, principally in the Lampongs.

During the good season *Paduwangs* to the number of 60 to 70, arrive in succession from Madura, laden with rice and kachang oil, also with dried fish or trassie (blachang) which they barter for betel nuts of which the exports, as has already been mentioned, amount to 3,000,000. —*Journ. Ind. Archip. Vol. V. No. 7.*

(220) BEAD SEEDS. Wild Jamaica Liquorice seed, *Abrus precatorius*, Lin.

Coondoomunny, TAM.	Retti, HIND.
Goomchie, DEK.	Telae, MALAY.
Ghoorie Ghinza, TEL.	Ractica, SANS.

The beautiful round seeds of the *Abrus precatorius* which are either red or white, are strung together and made into necklaces, bracelets and other ornaments. The white sort resemble pearls. They are also bruised into a fine powder by the goldsmiths and in this state used to increase adhesion, in joining together the more delicate parts of golden ornaments.—*Ainslie's Mat. Med. p. 142.*

(221) BEARS PAWS are regarded by the Chinese as a delicate dish though perhaps not the

most so which can be eaten, as is remarked by Mr. Gutzlaff.—*Williams' Middle Kingdom, p. 246.*

(222) BEATI MARAM, or Bombay black wood;—a wood which grows in Malabar and Travancore to a large size; some trees five feet in diameter, and fifty feet long, have been brought from Travancore, but the wood is generally not more than twenty or twenty-five feet long, and from twenty inches to two feet in diameter. It might be procured in great quantities in Travancore and the Cochin forests. Much of this wood is used in England, and called rose wood. Its general uses in India are for house furniture: great quantities are exported to Bombay, Madras, and Calcutta, for that purpose.—*Edye M. and C.*

Beauty or Carroo Marum Black wood, *Dalbergia latifolia* is common in Wynaad on open grass lands where the tree attains a great size.—*M. C. Jour.*

(223) BECHHACORI. A wood of and called in, Nepaul, Sulla and Surrendhool, or Dhoobkee (on account of its resinous quality). It is chiefly consumed in Nepaul. Its branches are used as torches: the fragrant turpentine which it yields is employed in sacrifices, and in medicated salves, and its wood is converted into rafts for houses.—*Smith's 5 years p. 67.*

(224) BEERBHOOM. Copper, Lead, and Iron Ores, at Deoghur, near Beerbhoom.

In the columns of the Calcutta papers of the 5th instant appears an official notice of the discovery of Copper, Lead, and Iron Ores at Deoghur, near Beerbhoom. Deoghur, or Byjnath, is a small town in the zilla of Beerbhoom, famous for its temples, visited every year by thousands of pilgrims from the Northwest Provinces of India. It is situated in the great table-land which extends from near Burdwan to Dunwa Ghaut, in Behar. The existence of the veins was made known as a great secret by a Bunnia about a year ago, the first visit being made to it by stipulation at dead of night. Granite, Syenite, and Gneiss, traversed by Greenstone veins, are the prevailing rocks around—the usual matrices of copper and lead veins all over the world: the soil consists of red and white gravel, composed of quartz and felspar, the detritus of these. The country all around is well wooded—much of it, indeed, is dense jungle: near the vein is a mountain torrent, which dries up in the fair season. The surface is undulating, and the drainage seems easy. The metals do not appear ever to have been worked or made use of. The vein at the surface runs east and west—it has been traced for a hundred feet continuously: the metal is partly pure, partly in the form of green carbonate. Veins of lead ore, partly pure, partly in the state of galena or sulphuret, traverse the principal vein at right angles. Both have been analysed, and found of remarkable



richness : the whole question of the value of the discovery consists in the expense of raising the ores and converting them into metal—facts that can only be determined by experiment, and this Government must make. Joint-stock companies are in such ill odour at present that no one will join them : capital is too scarce for individuals to embark in the scheme. Should the adventure look promising, Cornish miners from home may probably be induced to take it up. Provisions and labour seem cheap and plentiful all around, and the country not unhealthy, while hundreds of workmen can be had for one anna, or three halfpence, a day, and the country is such as to admit of carts with solid wheels. These carry about half a ton when drawn by buffaloes, about a third less with oxen. The nearest coal is forty miles off—the nearest point on the river where the ore could be shipped for Calcutta is sixty, the road being tolerable all the way. Considering the description of the country, we should have imagined that smelting might have been most economically managed by the use of the jungle wood on the spot, as neither copper nor lead ores of the description here mentioned are difficult to reduce, and part of the metal in both cases seems pure,—the copper might in all likelihood be separated from the malachite, which would alone remain for something, by stamping and washing—the more especially as there appears to be a convenient water-power close at hand. The existence of copper has been pointed out in the following localities in India—we are not aware of its being at present anywhere worked ;—near Beila, in the province of Lus, on the Western Frontier of Lower Seinde—by Captain Del Hoste and Captain Harris. In Kumaon,—by Lieutenant Gasford, and Captain Durand. At Porkee and Danpoor—by Captain Rickards. At Almorah, and in Afghanistan—by Captain Drummond. In the Nellore and Guntoor Collectorates. It is said to have been worked in Cutch, on the Neilgherries, and near the Phoondah Ghaut, but we are not aware of any specimens having been found in any of these localities.—*Bombay Times, June 19.*

(225) BEES. The charm used in China to keep off bees is a simple one ; viz. a few dry stems and leaves of a species of *Artemisia* which grows wild on the hills, and which is largely used to drive that pest the mosquito out of the dwellings of the people. This plant is cut early in summer, sun-dried, then twisted into bands and it is ready for use. At the commencement of the operation one end of the substance was ignited and kept burning slowly as the work went on. The poor bees did not seem to know what to make of it. They were perfectly good tempered and kept hovering about our heads, but apparently quite incapable of doing us the slightest injury. When the hives were properly fixed in their places the charm was put out, and my host and his ser-

vants carried off the honey in triumph. "Come," said he to the operator and us who were looking on, "come and drink wine." "Ay," said the half-witted priest, "drink wine." So we all adjourned to the refectory, where wine in small cups was set before us.—*Fortune's Residence.*

(226) BEETLES, in one part of Dr. Hooker's Travels, were most rare, and (what is remarkable) the wood-borers (*longicornis* and *Curculis*) particularly so. A large *Telephora* was very common.—*Hooker Him. Jour. Vol. II. p. 65.*

(227) BEGUM. Beebee, Bee, Nissa, Khanum ; Khatoon ; Banoo, HIND. are the respectful terms given to Mahomedan women in India.—*Herklots.*

(228) BELLEROM, the Tamil name of a Malabar wood, which is called in Malabar and Canara *Kyndle*. It resembles the wood named Angely at Cochin and in Ceylon. The Company's cruiser, Aurora, was built, by way of experiment, of this wood, procured from the forests in the north of Malabar ; and it appeared to answer its purpose.—*Edye M. and C.*

(229) BEMBUR, the Tamil name of a tree which grows on the Coromandel coast : it is remarkably durable and strong. The few natives who build vessels on that coast, prefer it to the other woods of the coast, which are not very abundant.—*Edye. M. and C.*

(230) BENINCASA CERIFERA, is the tallow-gourd of China, and remarkable for having its surface, when ripe, covered with a waxy exudation, which smells like rosin.—*Williams.*

(231) BEN OR VEN TEAK. In Tamil, and Bellinger in Malayala.—This tree is much used by the native carpenters for house-building and masts for dories, pattamahs, and other country vessels. It grows to ninety and one hundred feet long, and from twelve inches to three feet in diameter ; it is perfectly straight and without branches, excepting at its top ; the leaves are small and very thick. This wood is not so durable as the peon, but it may be considered of the same texture, although it is very much lighter in colour, and in this respect much resembles the American red oak.—*Edye, M. & C.*

(232) BERBAIT, MALAY, means to make Pantuns, for an explanation of particulars of which see Marsden. Here it may be sufficient to say a Pantun consists of 4 lines, the two first consist generally of simile or natural image and the 2 last a moral drawn from the simile. The Malays take great delight in listening to two poetical champions pantuning at each other till one is obliged to give in from want of further matter.—*Journ. In. Arch. No XI. Vol. V.*

(233) BERGERA KONIGII. Lin.

*The leaf.*

Caraway pillay, TAM.	Karrivaympakoo, TEL.
Karay pauk, DUK.	Kristna, SANS.

With this leaf Europeans, as well as Natives, give a pleasant flavor to curries, molagstannies,

## BIGNONIA QUADRILOCULARIS.

&c. The leaves are also considered as stomachic and tonic. A strong infusion of them (they having been previously toasted) is given, to stop vomiting, in cases of Cholera Morbus.—*Ainslie's Mat. Med.* p. 262.

### (234) BERRIA AMMONILLA.

Trincomalee Wood, ENG. | Hal Mililla, CING.  
Amumilla, CING.

A Native of Ceylon and one of their largest and most useful timber trees much of the wood is annually exported from Trincomalee and is used at Madras by carriage builders for *spokes* of wheels, frames, poles and shafts of carriages also for handles of tools &c. It is inferior to well seasoned Saul for spokes and to the Mimosa Arabica or babool for many other purposes to which it is applied—but it has the advantage of being comparatively light and is easily worked.—*Rohde M.S.S.*

### (235) BEZOAR.

Batu Nakit, JAVANESE.

In the interior of the Rajang district, in Borneo, are found in abundance two species of monkey which produce the Batu Nakit, or Bezoar stone. One is a large black monkey with a long tail called *Nakit*. One is large and red, but has no tail, and is called *basi*. In one out of ten or twenty of these two kinds are found the Bezoar; if not extracted quickly after the death of the animal, it is said to be of inferior size and quality.—*Mr. Burns in No. for Feb. 1849, of Jour. Ind. Arch.*

(236) BHAGAVAD GITA, name of a Sanscrit book translated by Wilkins.

(237) BHAND BHAGTEEAH, HIND.  
Mimics, actors.

(238) BIBLIOTHECÆ SANSKRITÆ A Catalogue, by Professor Gildemeister, of Bonn on the Rhine, published in 1847, of Authors, Indian and European, who have edited or translated Sanscrit works, or treated of Sanskrit literature.—*Cal. Rev.*

(239) BIGNONIA CHELENOIDES. This is a native of the mountainous parts of the coast of Coromandel, where it grows to be a large tree. Flowers during the hot and rainy seasons and the seed ripens in December and January. The wood of this tree is high colored, hard, durable, and of much use amongst the inhabitants of the hills where it is plentiful.—*Rohde M.S.S.*

(240) BIGNONIA INDICA. This is one of the tallest trees on the Coromandel coast, grows up amongst the mountains chiefly. Flowering time the beginning of the wet season. Seed ripens in January and February. The wood of this tree is soft and spongy so much as to render it unfit for use.—*Rohde, M.S.S.*

(241) BIGNONIA QUADRILOCULARIS. A large tree, a native of the Circar

## BINUA?

mountains. Flowers during the beginning of the hot season. The wood of this tree is employed for many purposes by the Natives.—*Rohde M.S.S.*

### (242) BIGNONIA SUAVEOLENS.

Patile, SANS. | Beng, PAML.

A native of Bengal and of the Southern parts of the Coromandel coast: a middle sized tree.—*Rohde, M.S.S.*

(243) BINUA. The Binua of Johore. This is not a very legitimate use of the word Binua, "orang Binua" literally meaning the people of the country. But it did not appear from enquiries made in many places, that they ever had any distinctive name. The Malays term them "orang-utan" men of the forest, "orang darat liar" wild men of the interior &c. epithets which they consider offensive, and the Malays generally address them as "orang-ulu" people of the interior, or rather of the upper part of the river. This people occupy all the interior of Johore properly so called, or that portion of the ancient kingdom of that name over which the Tamungeng now exercises the rights of royalty. They also possess the interior of the most southerly portion of Pahang. The most definite description of their territory however is, that they occupy the upper branches of the last or most southern system of rivers in the Malay Peninsula, that is of the rivers Johore (the Lingiu and the Sayong) Binut, Pontian, Batu Pahator Rio Formosa (the Simpang Kiri, Pau, and Simrong with their numerous affluents) and Indau (the Anak Indau, Simrong and Made), with the country watered by them. By means of these rivers a constant communication is maintained between the families of the Binua on the two sides of the Peninsula.—*Jour. Ind. Arch. Vol. No. V. Page 246, 1847.*

The lofty Gunong Bermun (which is probably nearly one hundred miles to the north of the Lulumut group) with the mountains which adjoin it, may be considered the central highlands of these tribes. In the ravines and vallies of Gunong Bermun, two of the largest rivers of the Peninsula, the Pahang and the Muar, with their numerous upper tributaries have their source. There also rises the Simujong which unites with the Lingi.

The upper part of these rivers and many of their feeders are occupied by five tribes of aborigines differing somewhat in civilization and language. The Udai (who appear to be the same people who are known to the Binuas of Johore under the name of orang Pago) are found on some of the tributaries of the Muar, as the Segamet, Palungan and Kapi, and in the vicinity of Gunong Ledang. This tribe has less approximated to Malayan habits than the others. The Jakun partially frequent the same territory, the lower part of Palungan, Gannam &c. and extend



northwards and north westward within the British boundaries.

In personal appearance the Binua bear a strong family resemblance to the Malays; and it was remarked of many of them, as was previously done of the Besisi, that the difference was scarcely appreciable so long as they remained at rest and silent.

The round swelling forehead of the Bugis, however, which rises evenly from the cheek bones and gives a distinctive character to their physiognomy, detracts from this resemblance, which appears to be caused mainly by the almost feminine fullness, smoothness, and symmetry of all the outlines, the absence of angular prominences or depressions, and the pleasing softness and simplicity of the expression, all which are wanting in the Malay. It should be added that the Bugis countenance bears an impress of intelligence, feeling, and sometimes, if it does not belie them, of a genial sensibility and imaginativeness. In many cases the Binua face is fat and fleshy, and all the features heavy, but in general, although full and rounded, it is not fat. The greatest breadth is commonly across the cheek bones, but in several instances where the jaws were prominent, the lower parts of the face was broadest.

Many of the Mintira around Gunong Bermun still wear the bark of the tirap, the men using the Chawat, and the women a piece of rude cloth, formed by simply beating the bark, which they wrap round their persons, and which, like the sarong of the Johore females, reaches only from the waist to the knees. The Udai females wear the Chawat like the males.

The only employment at a distance from the ladang which they share with the men, and sometimes pursue by themselves, is angling. Many families have small huts on the bank of the nearest stream where they keep canoes, and men, women and children, usually one in each canoe, are every where met with engaged in this quiet occupation. They have other modes of catching fish. The most common is by small portable traps woven of rattans. Rows of stakes are also used. But the most elaborate engine by which the rivers are sifted of their denizens consists of a large frame work, like the skeleton of a bridge, thrown right across the stream, and at a level some feet higher than the banks so as to be above inundation. A line of stakes is fixed across the bed, an opening being left in the middle. Above this the Binua takes his seat on a small platform, sometimes sheltered by a roof, and suspends a small net in the opening. On this he keeps his eyes intently fixed, and as soon as a fish enters, he raises his net and extracts it. The rivers and streams abound

more detailed account of the country which will follow.

At the period of the visit nearly every man in the country was searching for taban, to which the name of guttah percha, a gum yielded by a different tree, is erroneously applied by Europeans. It is time that an endeavour should be made to avoid these mistakes. We might with as much truth and propriety call an apple a pear. This tree is one of the most common in the forest of Johore. It is not found in the alluvial districts; but in undulating or hilly ground, such as that which occupies the centre of the Peninsula between the Indian and Batu Pahat, it occurs frequently, and in some places abundantly. Wherever he penetrated he found that taban collectors had preceded him. He was much struck by the remarkable uniformity in size of the full grown tabans. They had all perfectly straight trunks, from 60 to 80 feet in height, and from two to three feet in diameter, the great majority being about two and a half feet. The branches are few and small compared with the durian, and have not that tendency to be crooked which adds so much to the beauty of a full grown durian.

The Binua after felling the tree make an incision quite round it from which the milk flows. This is repeated at distances of 6 to 18 inches along the whole trunk. The incision has only the breadth of the parang with which it is made, no bark being removed save the rough superficial coating for an inch or two on each side. Many of the trees which had been felled by Malays instead of a single incision had rings of bark of about an inch in breadth cut out. A Malay woodman who had been employed in different places in procuring the gutta mentioned that this system is always adopted by the Malays. This is in corroboration of what Dr. Oxley has stated on this head in his excellent paper on the taban because in an article on the substance which appeared about the same time in Chambers' Edinburgh Journal, it is said the bark is stripped off the tree. It is to be feared that the method of obtaining the gutta suggested by Dr. Oxley cannot be put in practice. The writer of the article asked both Malays and Binuas in different parts of the country whether they could not procure it without destroying the tree in the same way as they collect minia dammer. But the answer always was that the taban would not run like dammer and many other gittas such as the ca-outchouc. This is probably the fact, because he noticed that on making incisions in growing trees, the milky juice did not flow freely, and rapidly concreted. Its appearance in this state before being boiled is very different from that of the article as imported into Singapore. It has a dry ragged look resembling shreds of bark, and instead

pieces. He frequently saw it in this state when newly brought in from the jungle. Various statements were made as to the produce per tree. Considering that the trees are so nearly of one size, it is surprising that the quantity of *tàbàn* yielded by them differs so much. The extremes mentioned were two catties, and fifty catties, but it is doubtful whether any thing near the latter quantity is ever obtained. Many Binuas who had been engaged for some months in the collections assured him that they had occasionally obtained as much as 18 catties but never more, and that the quantity is commonly nearer 3 to 5 catties than the maximum. The *tàbàn* is noticed at some length because an interest attaches to it at present, and because nearly the whole Binua people for sometime past have been withdrawn by it from their usual pursuits. They are not under any apprehension that it will be extirpated, and smiled at his ignorance on suggesting the probability of its being so. It is only trees arrived at their full growth, or at least at a very considerable age, that repay the labour of felling them and extracting the *gittá*, and those of all inferior ages which they are compelled to leave, will keep up the race. They are no doubt in so far correct, but the effect of thinning the *tàbàn* at the present rate is to reduce the annual supply of seed and young plants. The seeds are eaten by the Binuá, but they do not, like Malays in some countries, as at Siak, extract an edible vegetable tallow from them.

The *sumpitan* is known and is said to be used in some places. The bow and arrow are also known but not used. The Malays have not supplied them with articles so costly and dangerous as fire arms. All the Bermun tribes use the *sumpitan* and poisoned darts. Their *sumpitan* is a light and neat instrument and differs from that of the Dyak which is a piece of wood bored. That of the Bermun tribes (*timiang*) consists of two bambus seven feet in length one enclosed within the other. The external one, which is merely for strength and ornament, is about three-fourths of an inch in diameter, and neatly carved for about a foot at each end and in the middle. To prevent it splitting the fibrous bark of the *triáp* is bound round about 6 inches of the extremity and a coating of dammar placed over it. The internal tube, which is the proper *sumpitan*, is of the same length with the case but only three-fifths of an inch in diameter. It is composed of two pieces of bambu, united by a piece of 8 inches long, which embraces the ends tightly at the junction. The bambu used (the *bulu timiang*) is very light and fine grained.

The arrows (*damák*) are small darts made of the stem of the *birtam* leaf, 10 inches in length, and one sixteenth of an inch in diameter at the base, from which they gradually taper to a very fine sharp point. The base is inserted

into a cone of *káyu tutú* (which is very porous and light) about an inch in length and one-third of an inch in diameter at its base. The point of the dart is dipped for about five-sixths of an inch in *ipoh*. This is made by taking *akar ipoh*, *batang ipoh* (or *kyas*), *limes*, and *tuba*, which are bruised, boiled and strained. To this arsenic is added. Other substances, such as *páchet*, *jimardès*, *máilye*, and *gadong*, are also sometimes added. The preparation, called *ipoh*, has the colour and consistency of *chandu*. An incision is made round the dart above the *ipoh* so as to ensure its breaking off and remaining in the wound.

Each dart is kept ready for use in a case of bambu about one-fourth of an inch in diameter. Fifty of these cases are laid side by side and united by strings. They are then rolled up and inserted into a case also made of bambu, and which has a neat lid of *jalutong*. The same case contains a quantity of *barok* (a very light, spongy substance, also used as tinder) extracted from a tree called *runout*. After inserting the dart into the *sumpitan* a little *barok* is introduced. When the Binua blows into the tube, it is pressed against the base of the *kaya tutucone*, and prevents any of the air escaping between it and the sides. In shooting, the *sumpitan* is held firm by both hands being tightly clasped over its end, which is inserted into a handle.

*Government.*—The boundary between Pahang and Johore intersects the country of the Binua, the whole of the *Anak Indau*, and the lower part of the *Sinrong* being in Pahang, and all the other rivers, including the *Made*, on which they are found, appertaining to Johore. The authority of the *Bindahara* and the *Tamungong* is little more than nominal, the affairs of the Binua being entirely administered by their own chiefs, each of whom has a definite territorial jurisdiction.

*Religion and Traditional Origin.*—So far as he was able to ascertain, the Bermun tribes have no idea of a Supreme Deity, and he took it for granted that he would find the Binua equally atheistic. His surprise was therefore great when he discovered that they have a simple, and, to a certain extent, rational theology. They believe in the existence of one God, *Pirman*, who made the world and every thing that is visible, and at whose will all things continue to have their being. *Pirman* dwells above the sky, and is invisible. Intermediate between *Pirman* and the human race are the *Jin*,—the most powerful of whom as the *Jin Bumi* or Earth Spirit, who is *Pirman's* minister. He dwells on the earth, feeding on the lives of men and of all other living things. It is the *Jin Bumi* who sends all kinds of sickness and causes death; but this power is entirely derived from *Pirman*. Each species of tree has a *Jin*. The rivers have a spiritual life, but it is that of the *Jin Bumi*,



who haunts them with his power. The mountains are also animated by him. He does not, therefore, appear to be entirely a personification of the destructive power of nature, but to be, to some extent, identified with its living force also. There is no religious worship, but to avert death recourse is had in sickness to a Poyang, no other person being supposed to have the right of imploring mercy from Pirman. The Poyangs are an order of men combining the functions of priest, physician and sorcerer.

A complete parallel exists between the religions of the Dyaks, Binuas and Battas, and the elaborate and luxuriant imaginations with which the primary and essential ideas have been overrun by the first, and the simplicity in which they have been retained by the second, are directly referable to the difference in the characters and developments of the two people. The primitive religion of the Archipelago, a variety of the Shamanism, which probably prevailed before Buddhism over all eastern Asia, which lingers around the mosque, and has not entirely faded away in the West in the presence of nearly 2000 years of Christianity, is still the essential belief of the Dyak, the Binua and the Batta. In it they repose a practical faith. By it they seek to defend themselves from diseases and other misfortunes, to secure the ministry of good spirits, and counteract the maleficence of evil ones. It is one of the living springs of their habitual thoughts and actions, and as such remains a prominent link between the extreme south and the north of Eastern Asia.

Amongst the Bermun tribes we recognize a pure Shamanism with its accompanying charms and talismans; a living faith fresh from the ancient days of eastern and middle Asia, preserving its pristine vigour and simplicity in the nineteenth century, untouched by the Buddhistic deluge which has passed over the vast south eastern regions, and sent so many waves to different parts of the Archipelago; and resisting the pressure of the Islamism which surrounds it.

The Poyang and Pawang of the Bermun tribes, the Poyang of the Binua, the Blians of the Dyaks, and Dato and the SiBasso of the Battas, are all the shaman, the priest, wizard, physician, in different shapes.

In the course of this paper there has been occasion to compare or contrast the aborigines of the south of the peninsula with the Malays, the Battas and the Dyaks.

The character of the Binua, the Dyak and the Batta is essentially the same, and may still be recognized in the Malay. The Binua has less development of intellect, and less corruption of the passions.

The Battas and Dyaks have long outgrown the close pressure of nature, and agglomerated

into social masses in which the passions have fermented, and the intellect and imagination been quickened. But these social masses have been small, nature has not been driven back on all sides as in the plains and slopes of Menangkabau. Hence both the Batta and most of the Dyaks still preserve the Binua character at bottom; but, unlike the Binua, they have elaborated their superstitions and their social habits, and have acquired some vicious propensities, such as gambling, which the Battas carry to a mad excess, and the unnatural customs of head hunting and man eating, which are only more startling illustrations of the universal truth, that, without a religion like Christianity, which does not stop at precepts and doctrines but spiritualizes the very springs of action, and fills the soul with the divine idea of the world, virtues and vices, and particularly those which are national, may dwell together in harmony. It is undeniable that the Battas as a people have a greater prevalence of social virtues than most European nations. Truth, honesty, hospitality, benevolence, chastity, absence of private crimes, exist with cannibalism.—*Jour. of the Indian Archipelago, page 293. No. V. November 1847.*

(244) BIRDLIME. The best is prepared from the outer covering of the fruit and tender twigs and bark of the Jack. It is prepared from the middle bark of the holly in Europe by boiling seven or eight hours in water, then laid in heaps on the moist ground to ferment, with stones over it, to press it down till it passes into a mucilaginous state, then pounded, washed and kneaded till free from extraneous matter and kept for four days in pots to ferment and purify itself when it is fit for use.—*Rohde M.S.S.*

(245) BIRDS. The birds of India are scarcely less beautiful than numerous. Perhaps the choicest of them all are those of the Himalayan pheasant tribe, birds distinguished for their very graceful and rich plumage. The Himalayan bustard is remarkable for its form and varied colour. Peacocks, eagles, falcons, vultures, kites, cranes, wild geese, wild fowl, snipes, bustards, parrots, and paroquets, the latter in every conceivable variety, abound in all parts at various seasons. *Capper.*—In England, on the return of spring,

“Every copse

Deep tangled, tree irregular, and bush  
Bending with dewy moisture o’er the heads  
Of the coy quiristers that lodge within,  
Are prodigal of harmony,

but, in the tropics generally, there are few Europeans who will dare the sun to search for the beauties of Nature and comparatively little is known of the songs of birds. Few of us can say with the rustic poet Clare.

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"I've often tried when tending sheep or cow,  
With bits of grass and peels of oaten straw,  
To whistle like the birds. The thrush would start  
To hear her song of praise and fly away;  
The black bird never cared, but sang again;  
The nightingale's pure song I could not try,  
And when the thrush would mock her song, she  
paused,  
And sang another song no bird could do.  
She sang when all were done, and beat them all."

The nidification of Indian birds has been noticed by Capt. Thomas Hutton, F. G. and (communicated by E. Blyth, Esq.) Capt. Tickell.

Captain Tickell made a praiseworthy beginning in the April number of the Journal of the Asiatic Society for 1848, to dispel the darkness that has hitherto hung over our knowledge of this portion of the history of the Birds of India, and Captain Hutton thought it advisable, being in possession of a few facts bearing on the subject, to follow in the path Captain Tickell had so well pointed out.

### No. 1 "*Haliaetus Macei*, Cuv."

I notice, he says, this species because Captain Tickell has remarked that it "never makes the slightest attempt at defending its nest,—a striking contrast to the marvellous tales we read of, concerning the Golden Eagle in the Highlands of Scotland, &c." This remark is correct only as long as there are eggs in the nest, for no sooner are these hatched than the temper of the bird becomes wholly changed, and it will then defend its young with fierceness and determination. The nests I have repeatedly found and robbed, both on the banks of the Ganges and of the Sutledge, and in all cases where they contained only eggs, not the least show of resistance was made,—the old birds either sailing with a loud querulous cry, or sullenly remaining on an adjacent tree, watching the robbery that was going on. On one occasion, however, I met with a very different reception, when my servant was attacked with an unexpected ferocity from which nothing but my gun could have saved him. The circumstance occurred in January 1832 when on my way up the country. The nest was placed near the summit of a tree growing on one of the Colgong rocks in the middle of the Ganges, and contained two half-fledged young ones. The old birds offered a most determined resistance, and without the aid of fire-arms we should decidedly have been defeated, as they dashed fiercely and fearlessly at the man in the tree—who prayed hard to be allowed to descend, and was only kept at his post by the promise of reward and fear of the cudgel. At first we had to contend with the female only, but after one or two rapid stoops and dashes at the robber's head, which he avoided by robbing under the nest, finding she could make no impression, she suddenly uttered a shrill cry, which was responded

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to in the distance and in an instant after, her mate was seen swiftly gliding to her aid from the opposite bank of the river. The two then charged together towards the nest with the rage and fierceness of despair, and so terrified the man in the tree, hampered as he was with the young ones, that had I not fired at and wounded the Eagle as they advanced, they would assuredly have hurled him into the river. In this manner, however after repeated attempts to come to the rescue, we managed at last to drive off, and secure the booty. At the end of 5 weeks the young ones exhibited as nearly as possible the plumage of the bird figured by Hardwicke and Gray as "*H. lineatus*."

### No. 2.—"*Ephialtes scops*," (L.):

*E. spilocephalus*, Blyth, (a large specimen in immature plumage):

*Scops pennata*, Hodgson (Grey variety):

*Sc. sumia*, Hodgson (rufous variety).

This species occurs on the Himalaya in the neighbourhood of Mussooree, at an elevation of about 5,000 feet, and nidicates in hollow trees, laying, 3 pure white eggs, of a rounded form, on the rotten wood, without any preparation of a nest. Diameter of egg  $1\frac{3}{8}$  x 1 ins. The nest was found on the 19th March.

In the 169 number of the J. A. S. for 1846. Mr. Blyth has named and described this species as "*Ephialtes spilocephalus*," giving "*Noctua auribarbis*" and "*Athene badia*" of Hodgson, as doubtful synonyms.

In plumage and aigrettes the bird is to all appearance a *Scops* or *Ephialtes*,—but the wing is that of *Noctua* or *Athene*, having the 14th and 15th feathers longest—whereas in *Scops*, as laid down by Mr. Hodgson in J. A. S. No. 65 of 1827,—the 3d and 4th are longest. Mr. Gray, in his Catalogue of the collection presented by Mr. Hodgson to the British Museum, gives "*N. auribarbis*" of that naturalist as a synonyme of "*Athene cuculoides*" of Vigors,—but it seems scarcely probable that Mr. Hodgson would have placed his "*auribarbis*" in the genus "*Noctua*." If the characters of the wing rendered it improper so to place it. Had such however been the case, the necessity for coining a new specific name is not apparent. This handsome little species appears to agree neither with *Scops* nor *Athene*,—for while the wing belongs to the latter genus,—the plumage, aigrettes and nude feet refer it to the former. It would now seem however that neither *Scops* nor *Ephialtes* can stand for a genus of owls,—the first being otherwise employed in Ornithology,—while the latter is a genus in Entomology instituted by Gravenhorst. (Vide Mat. Lib. Introd. Entom.) It is therefore necessary to form a genus of these owls.

### No. 3.—"*Athene Brodiei*," (Burlon.)

This pretty little species is exceedingly common in the Himalayas in the neighbourhood of



Mussooree and Simla, and may be heard at nightfall uttering its monotonous but not unmusical whistle of two notes of times repeated. Like the last, it nidificates in hollow trees without any preparation of a nest. On the 11th May, he found 3 young ones and an egg just ready to hatch in a hole of a wild Cherry tree. The egg was nearly round and pure white, but being broken he could take no measurement of it. The young ones were clothed in a soft and pure white down.

In both these instances, namely, "*A. nudipes*" and "*A. Brodiei*," the old females remained in the holes while they cut into the trees, and allowed themselves to be captured.

No. 4.—"*Caprimulgus albonotatus*," Tickell. *C. Nipalensis*, Hodgson, (Gray's Zool. Misc.)

Of this species, which is a summer visitor at Mussooree, Captain Tickell says, the eggs are "fleshy clay colour, sprinkled with patches of darker brownish red: females, paler and redder." He took 2 eggs of this bird at an elevation of 5,000 feet, on the 19th April, from the bare ground beneath bushes on the side of a hill, the colour being a rich cream white with darker blotches of reddish brown or clay colour. Of one the diameter was  $1\frac{1}{4} + \frac{7}{8}$  inches, the other was somewhat smaller.

No. 5.—"*Garrulus lanceolatus*," Vigors. *G. gularis* et *G. Vigorii* (Gray's Ill. Ind. Zool.)

This is one of the commonest birds in the Hills, usually appearing, except in the breeding season, in small parties of 5 or 6, most probably comprising a family. It breeds in May and June, placing the nest sometimes on the branch of a tall oak tree (*Quercus incana*); at other times in a thick bush. It is composed of a foundation of twigs, and lined with fine roots of grass, &c., mixed with the long black fibres of ferns and mosses which hang upon the forest trees, and have much the appearance of black horse hair; the nest is cup-shaped, rather shallow loosely put together, circular and about  $4\frac{1}{2}$  inches in diameter. The eggs are sometimes 3, sometimes 4 in number, of a greenish stone-gray, freckled chiefly at the larger end with dusky,—and a few black hairlike streaks, which are not always present; they vary also in the amount of dusky freckling at the larger end. Shape ordinary. The nestling bird is devoid of the lanceolate markings on the throat, and in this stage is the "*Garrulus Vigorsii*" of Hardwicke and Grey.—"*Bunsareah*" of hillmen.

No. 6.—"*Garulax albogularis*," (Gould.)

*Cinclosoma albigula*, Hodgson.

Is very common at Mussooree at all seasons and appears in large flocks of several families united. It breeds in April and May,—placing the nest in the forks of young oaks and other trees about 7 to 8 feet from the ground, though

climbing plants. It is sometimes composed externally almost entirely of such woody tendrils intermixed with a few other twigs, and lined with black hair—like fibres of mosses and lichens; at other times it is externally composed of coarse dry grasses, and leaves of different kinds, of orchis, and lined with fibres; the materials varying with the locality. Unlike the eggs of *Crateropus*, which are stated to be white,—in this species they are of a deep and beautiful green, shining as if recently varnished, and 3 in number. In shape they taper somewhat suddenly to the smaller end, which may almost be termed, obtusely pointed; the diameter  $1\frac{1}{8} + \frac{1}{8}$  inches. The usual number of eggs is three, though they vary sometimes to one or two,—but only on one occasion out of more than a dozen, had he found four eggs. The old bird will remain on the nest until almost within reach of the hand.

No. 7.—"*Trochalopteron ? rufigularis*." (Gray's Catalogue.)

*Crateropus rufimentum*, (Hodgson.)

This species differs from the last in not congregating into large and noisy flocks, but appearing usually, according to his observation in pairs. It breeds in May, in which month he took a nest at about 6,500 feet, in a retired and wooded glen; it was composed of small twigs externally, and lined with the fine black fibres of lichens, like the preceeding. The nest was placed on a horizontal bough about 7 feet from the ground, and contained 3 pure white eggs. Diameter  $1\frac{1}{8} + \frac{1}{8}$ , and shape ordinary. The stomach of the old bird contained sand, seeds, and the remains of wasps.

No. 8.—"*Trochalopteron ? setifer*." (Hodgson and Gray, Zool. Misc.)

*Cinclosoma setifer*, Hodgson.

*C. lineatum*, Vigors?

If the colour of the eggs affords any generic character, this and the foregoing species cannot well rank together, for while in that the eggs are pure white, as in *Crateropus* in this they are pale greenish blue (like those of "*Acridotheres tristis*."\*) The nest is loosely and rather slovenly constructed of coarse dry grass and stalks externally lined sometimes with fine grass, sometimes with fine roots. It is placed near the ground in the midst of some thick low bush,—or on the side of a bank amidst over hanging coarse grass, and not unfrequently in exposed and well frequented places. The eggs are 3 in number, and in shape and size exceedingly variable, being sometimes of an ordinary oval—at others nearly round. Diameter varying,— $1\frac{3}{8} \times \frac{1}{8}$ ; or  $1 \times \frac{1}{8}$ ; or  $\frac{1}{8} + \frac{1}{8}$ . The most usual measurement however is the second one, or  $1 \times \frac{1}{8}$  inches.

In these three species, which have sometimes

points both of similarity and dissimilarity, in their habits and manners.

In the number of eggs they agree, and there is a general similitude in the construction of the nest, more so between the two first—less so between them and the last; in the colour of the eggs they all differ very materially; the first congregates into large and noisy flocks,—turning up the dead leaves and screaming and chattering together in most discordant concert. The second is most usually in pairs—sometimes in a family of 4 or 5; the last in pairs or family of 4 or 5, and to be seen under every bush. Its mode of flight and its note are totally unlike the other two. Any one observing the birds in their native haunts, could not fail to perceive that *G. albogularis* and *G. leucolophus* are allied in manners, voice and habits; that *G. rufigularis*, *G. erythrocephalus* and *G. variegatus* are likewise allied,—and that *Trochaloxyron setifer vel lineatum* stands distinct from all; the three forming distinct sections of the same group.\*

No. 9.—“*Acridotheres griseus*,” (Horsfield.)  
*Maina cristalloides*, Hodgson.

This is a summer visitor in the hills, and is common at Mussooree during that season, but it does not appear to visit Simla, although it is to be found in some of the valleys below it to the south. It breeds at Mussooree in May and June, selecting holes in the forest trees, generally large oaks, which it lines with dry grass and feathers;—the eggs are from 3 to 5, of a pale greenish blue; shape ordinary, but somewhat inclined to taper to the smaller end;—diameter  $1\frac{3}{16} + \frac{1}{16}$  inches; or  $1\frac{2}{16} + \frac{1}{16}$  inches. This species usually arrives from the valley of the Doon about the middle of March; and until they begin to sit on their eggs, they congregate every evening into small flocks and roost together in trees near houses; in the morning they separate for the day into pairs and proceed with the building of nests or laying of eggs. After the young are hatched and well able to fly, all betake themselves to the Doon in July.

No. 10.—“*Acridotheres tristis*,” (Linn ?)

This too is a summer visitor in the hills, arriving with the preceding species. The colour and number of eggs are also the same. It is curious however to observe that while Mr. Blyth and Captain Tickell state, that it builds in “out-houses, verandas and trees,” in which last, according to the latter gentleman, the nest is composed of “twigs and grass within,”—with us in the mountains its habits are precisely those of *A. griseus* and as with it, the whole of a tree is selected and lined with wild grass and feathers;—on no occasion had he ever seen a nest made on the branches of a tree, and only once in any place except the hollows of large oaks; the exception being in the chimney of his house, which the stupid had evidently mistaken for a hollow tree, and

seemed to be amazed that all the grass and feathers dropped into it invariably fell to the bottom, at last it contrived to place some grass on a projecting brick. Can this difference betoken a distinction in species? He is inclined to believe it for why in the plains should a nest be constructed among the open branches of trees,\*—while in the mountains it is constructed within their hollow trunks? If distinct, it will, he imagines, bear Mr. Hodgson's ill-constructed name of *A. tristoides*.”

No. 11.—“*Corvus culminatus*,” Sykes.

[*C. orientalis*, Eversman.]

Occurs at Mussooree throughout the year, and is very destructive to young fowls and pigeons; it breeds in May and June, and selects a tall tree, near a house or village, on which to build its nest, which is composed externally of dried sticks and twigs, and lined with grass and hair, which latter material it will pick from the backs of horses and cows,—or from skins of animals laid out to dry. He had skins of the Surrow (*Nemorhædus thar*) nearly destroyed from their depredations. The eggs are 3 or 4 in number and of a dull green, thickly spotted over with long and sometimes confluent spots and dashes of dusky brown or blackish. Diameter  $1\frac{2}{8} + 1$  inch.

No. 12.—“*Saroglossa spiloptera*,” Hodgson.

*Lamprotornis spilopterus*, Vigors.

This species arrives in the hills about the middle of April, in small parties of 5 or 6, but it does not appear to ascend above 5,500 to 6,000 feet and is therefore more properly an inhabitant of the warm valleys. He does not remember seeing it at Mussooree, which is 6,500 to 7,000 feet,—although at 5,200 feet on the same range, it is abundant during summer. Its note and flight are very much those of the Starling (*Sturnus vulgaris*), and it delights to take a short and rapid flight and return twittering to perch on the very summit of the forest trees; He had never seen it on the ground, and its food appears to consist of berries. Like their two species of *Acridotheres*, it nidificates in the holes of trees, lining the cavity with bits of leaves, cut by itself; the eggs are usually 3, or sometimes 4 or 5, of a delicate pale sea green, speckled with blood like stains, which sometimes tend to form a ring near the larger end—shape oval, somewhat tapering; diameter  $1\frac{1}{8} + \frac{1}{16}$  inches.

No. 13.—“*Pomatorhinus erythrogenys*,” Vigors.

*P. ferrugilatus*, Hodgson.

Common from 3,500 feet up to 10,000 feet; always in pairs, turning up the dead leaves on copse-wood covered banks, uttering a loud whistle, answering and calling each other. It breeds in April constructing its nest on the ground, of coarse dry grasses and leaf stalks of walnut trees &c.; covered with a dome-shaped roof so nicely blended with the fallen leaves and withered grass—



es among which it is placed as to be almost undistinguishable from them. The eggs are 3 in number and pure white; diameter  $1\frac{2}{8} + \frac{1}{8}$  inches of an ordinary oval shape. When disturbed, the bird sprung along the ground with long bounding hops so quickly, that from its motions and the appearance of the nest, he was led to believe it a species of rat. The nest is placed in a slight hollow, probably formed by the bird itself.

No. 14.—“*Pycnonotus leucogenys*,” Gray.

*Ixos leucogenys*, Hodgson and Gray.

*Brachypus leucogenys*, (Hardw., Gray. Ill. Ind. Zool.

Common in the Doon all the year, and in the hills during the summer. It breeds in April and May. The nest is neat and cup-shaped, placed in the forks of bushes or pollard trees, and is composed externally of the dried stalks of “Forget-me-not,”—lined with fine grass stalks; eggs 3 or 4, rosy or faint purplish white, thickly sprinkled with specks and spots of darker rufescent purple or claret colour; diameter  $\frac{1}{8} + \frac{1}{8}$  inches; diameter of nest  $2\frac{1}{2}$  inches and  $1\frac{1}{2}$  inch deep. Sometimes the outside of the nest is composed of fine dried stalks of woody plants, whose roughness causes them to adhere together.

No. 15.—“*Hypsipetes psaroides*,” Vigors.

Exceedingly common at Mussooree in large flocks during the winter and spring. In the latter season, when the *Rhododendron arboreum* is covered with its branches of deep crimson flowers, these birds may be seen thrusting their beaks into every flower in search of insects and nectar, and the forehead is in consequence then generally covered with the pollen and sweets derived from the flowers. It pairs in April and appears fond of the wild mulberries and other forest berries which abound in some of the glens. In March at an elevation of 5,000 feet, he saw them feeding on the wild cherries. They breed during April, May and June, making a rather neat cup-shaped nest, which is usually placed in the bifurcation of a horizontal branch of some tall tree; the bottom of it is composed of thin dead leaves and dried grasses, and the sides of fine woody stalks of plants, such as those used by *Pycnonotus leucogenys*, and they are well plastered over externally with spiders’ webs; the lining is sometimes of very fine tendrils, at other times of dry grasses, fibrous lichens and thin shavings of the bark of trees, left by the wood-cutters. He had one nest, however, which is externally formed of green moss with a few dry stalks, and the spider’s webs instead of being plastered all over the outside, are merely used to bind the nest to the small branches among which it is placed. The lining is of bark shavings, dry grasses, black fibrous lichens and a few fine seed stalks of grasses. The diameter of the nest is  $2\frac{3}{4}$  inches; and  $1\frac{1}{2}$  inch deep. The eggs are usually 3 in number, of a rosy or purplish white sprinkled over rather numerously with deep claret or

rufescent purple specks and spots. In colour and distribution of spots there is great variations, sometimes the rufous and sometimes the purple spots prevailing; sometimes the spots are mere specks and freckles; sometimes large and forming blotches; in some the spots are wide apart, in others they are nearly and sometimes in places quite confluent; while from one nest the eggs were white, with widely dispersed dark purple spots, and dull indistinct ones appearing under the shell. In all, the spots are more crowded at the larger end. Diameter varying from  $1\frac{1}{8}$  inches, to  $1\frac{7}{8} + \frac{1}{8}$  inches. “Bunbukri,” of hill men, from a fancied resemblance of one of its cries to that of a goat.

No. 16.—“*Treron sphenurus*,” (Vigors.)

*Vinago sphenura*, Vigors.

*Ptilonopus macronotus et tinturoides*. (Hodg., Gray.)

*Treron cantillans*, Blyth, (the caged bird, moulted in confinement)

This species which is the “Kookla” of the natives arrives in the neighbourhood of Mussooree in the beginning of April, and remains during the summer to breed; it is usually silent during the height of the monsoon, but may occasionally be heard on a bright day. It is probable that it migrates to the eastward on leaving Mussooree, as it does not winter in the Doon, nor does it occur there even in summer, being apparently a true hill species. In confinement it loses or does not put on the maroon mantle which ornaments the wild bird, and the plumage assumes a dull greenish ashy hue, in which state it is the *T. cantillans* of Mr. Blyth. The nest is composed of dried twigs, and the eggs are usually 2 in number and pure white, and more gracefully ovate than those of *Turtur risorius*. Diameter  $1\frac{2}{8} + \frac{1}{8}$  inches. The breeding season is from the end of April till the latter end of June; the nest a slight platform, usually placed in high forest trees. In October they collect into small flocks of 6 or 8, and quit the neighbourhood of Mussooree; where do they then go to? The female differs from the male, in the absence of the fulvous colour of the top of the head and breast, and in wanting the beautiful maroon colour on the mantle and lesser wing coverts; the greater wing coverts are also more broadly edged with pale yellow. Mr. Blyth states of this species that it is distinguishable from *T. nipalensis*, (Hodgson,) “by having but a slight pale yellow margin to only the great coverts of the wing;” whereas in both male and female, the great coverts, tertiaries, and primaries are edged with that colour, although on the latter it amounts to a mere thread. These birds are very fond of the wild mulberries and other forest fruits. Gould, in his ‘Century of birds,’ appears to think the species is only found far within the mountains, whereas it occurs on the outer or southernmost range overhanging

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the Doon, from an elevation of 4,000 feet, probably to the snows. The Huryal, or *T. phoenicopterus*, lays a similar egg but is confined to the plains, ranging up to the base of the mountains but never ascending them.

No. 17.—“*Turtur risorius*” Selby.

*Columba risoria*, Linn.

*T. douraca*, Hodg. Gray.

This is common in the Doon at all seasons, only visits Mussooree during summer, arriving on the hills about the end of March and returning to the plains in October. It breeds in April, May and June, making a loose platform nest of dried twigs with a few roots within; the eggs are 2 in number and pure white; diameter  $1\frac{3}{5} + \frac{1}{8}$  inches.

No. 18.—“*Turtur orientalis*,” (Latham.)

*Columba meena*, Sykes.

*C. agricola*, Tickell.

*C. pulchrata*, Hodg.

*C. ferrago*, Eversmann.

This also is a mere summer visitor at Mussooree, where it arrives early in April, when every wood resounds with its deep-toned cooing;—it is not found lower than, 6,000 feet there,—and departs in October. At Mussooree it breeds in May, making a platform nest on tall forest trees; the eggs are 2 and pure white; diameter  $1\frac{4}{6} + \frac{1}{8}$  inches.

No. 19.—“*Turtur suratensis*,” (Gm.)

*T. vitticollis*, Hodg.

*Columba tigrina*, Temm.

Abundant in the Doon, and arrives in the hills in the end of March, leaving again in the autumn. It breeds at about 5,000 feet and lays 2 white eggs,—diameter 1 inch  $+ \frac{1}{8}$ . Captain Tickell says, “eggs 2 to 16;” He had never seen more than 2 in any nest.

No. 20.—*Turtur senegalensis*, (Linn.)

*C. cambaiensis*, Gm.

Arrives at 5,000 feet like the others about March or April, departing again in Autumn;—its eggs are 2, and pure white;—diameter 1 inch  $+ \frac{1}{8}$ . He had observed in this, as well as in the foregoing different species of *Turtur*, a tendency in the eggs to become suddenly pointed, or slightly nipple-shaped.

Notes on the Nidification of Indian Birds. Captain Thomas Hutton.—*F. G. S. in Ben. A. S. Journ.* (Continued from No. 193 for July 1848.)

No. 21.—“*Psilorhinus occipitalis*” (Blyth, J. A. S. XV. 27.)

“*Pica erythrorhyncha*” (Gould’s Century.)

“*Psilorhinus albicapillus*.” (Blyth nestling plumage.)

This species occurs at Mussooree throughout the year, collecting into small parties of 4 to 6 during winter. It breeds at an elevation of 5,000 feet in May and June, making a loose platform nest, externally lined with roots.

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The eggs are from 3 to 5, of a dull greenish ash-grey, blotched and speckled with brown dashes, confluent at the larger end. Diameter  $1\frac{1}{8} + \frac{1}{8}$  inches. The ends nearly equal in size. The nest is built on trees sometimes high up; at others about 8 or 10 feet from the ground.

The “*Psilorhinus albicapillus*” of Mr. Blyth, is nothing more than the nestling of this species as he had fully ascertained by robbing several nests,—the plumage of the young birds agreeing exactly with his published description.

No. 22.—“*Dendrocitta sinensis*.” (Gray.)

*Crypsirina sinensis*. (Hodg. Gray.)

*Pica sinensis*. (Gray.)

*Corvus sinensis*. (Daud.)

Occurs abundantly about 5,000 feet during summer, more sparingly at greater elevations,—and in the winter it leaves the mountains for the Doon. It breeds in May, on the 27th of which month he took one nest with three eggs and another with 3 young ones. The nest is like that of *Psilorhinus occipitalis*, being composed externally of twigs and lined with finer materials according to the situation,—one nest taken in a deep glen by the side of a stream was lined with the long fibrous leaves of “mare’s tail” which grew abundantly by the waters edge; another taken much higher on the hill side and away from the water, was lined with tendrils and fine roots. The nest is placed rather low, generally about 8 or 10 feet from the ground, sometimes at the extremity of a horizontal branch, sometimes in the forks of young bushy oaks. The eggs somewhat resemble those of the foregoing species, but are paler and less spotted, being of a dull greenish ash, with brown blotches and spots somewhat thickly clustered at the larger end. Diameter  $1\frac{3}{8} + \frac{1}{8}$  inches. Shape ordinary.

No. 23.—“*Geocichla citrina*.” (Blyth.)

*Petrocossyphus citrinus*. (Gray’s Cat.)

*Turdus citrinus*. (Lath.)

*P. pelodes*. (Hodg.) Young.

Arrives at an elevation of 5,000 feet about the end of May and returns to the plains in autumn, it breeds in June, placing the nest in the forky branches of lofty trees, such as oaks and wild cherry, externally it is sometimes composed of coarse dry grasses somewhat neatly interwoven on the sides,—but hanging down in long straggling ends from the bottom. Within this is a layer of green moss and another of fine dry woody stalks of small plants and a scanty lining at the bottom of fine roots. The eggs are 3 to 4 in number, pale greenish freckled with rufous, the spots of that colour confluent and forming a patch at the larger end. Diameter  $1\frac{3}{8} + \frac{1}{8}$  inches. Somewhat gibbous at the larger end.

No. 24.—“*Geocichla unicolor*.”

*Turdus unicolor*. (Tickell and Gould.)

*Petrocincla homochroa* (Hodg. Gray.)

*Petrocossyphus unicolor*. (Gray’s Cat.)



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This bird arrives in the hills up to 7,000 feet, and probably higher, about the end of March the first being heard (in the year 1848) on the 26th of that month at 5,000 feet. Every morning and evening it may be heard far and near, pouring forth a short but pleasing song from the very summits of the forest trees. It is a summer visitor only, returning to the plains in early autumn. It breeds in May and June, laying 3 or 4 eggs of a dull greenish white freckled, blotched and spotted with rufous, sometimes closely,—sometimes widely distributed.

The nest is neatly made of green moss and roots, lined with finer roots, and placed usually against the body of the trees from whence spring one or two twigs sometimes placed upon the broad surface of a thick horizontal branch or on a projecting knob. The diameter of egg— $1\frac{1}{8} \times \frac{1}{8}$  inches, varying a little; shape sometimes ordinary ovate, at others more rounded at the smaller end. When shot, the crop usually contained the half ripe berries of a species of laurel (*L. lanceolatus*?)

The following is the description of a male, shot while singing on the topmost branch of an oak tree (*Quercus incana*.)

Male.—Bill yellow, as also the rim of the eyelid, gape, inside of mouth and the legs. Iris brown. Length inches. Wing from bend  $4\frac{3}{4}$  inches. Above uniform pale slate-grey; throat, breast, and sides ash colour, the former palest and nearly white on the chin. Belly and under tail coverts pure white; under wing coverts bright ferruginous. Nails yellow, length of bill to gape  $1\frac{3}{8}$  inches. Tarse  $1\frac{1}{8}$  inches.

Female. Bill wax yellow with dusky about the nostrils; legs and feet wax yellow; Iris brown; length 9 inches; wing from bend  $4\frac{3}{4}$  inches; bill to gape  $1\frac{3}{8}$  inches; to forehead  $\frac{7}{8}$  inches. Above uniform dark ashy gray; chin and throat pale cinereous, bordered by a dark stripe descending from the base of lower mandible, between which the feathers are longitudinally dashed with dark centres, breast and sides ashy tinged with fulvous; belly, vent and lower tail coverts white; under wing coverts bright ferruginous; ear coverts ashy with pale shafts.

The nestling is above like the female, but beneath the throat and chin are purer white in some; in others with a rufous tinge but no spots between the stripes descending from the base of lower mandible, and the breast much spotted with brown; scapularies and greater wing coverts tipped with triangular fulvous spots ascending through the shafts of the feathers. This during the summer months is one of the commonest birds in the hills, especially about 5,000 feet, where their nests are numerous

No. 25.—“*Myophonus Temminckii*.” (Vigors, Gould.)

*M. metallicus*. (Hodg.)

On the 16th June last, at 5,000 feet, I shot

bird, each containing 3 eggs, and another one containing three nearly fledged young ones. The nest bears a strong resemblance to that of the *Geocichla* above noticed, but is much more solid, being composed of a thick bed of green moss externally lined first with long black fibrous lichens, and then with fine roots. Externally the nest is  $3\frac{1}{2}$  inches deep, but within only  $2\frac{1}{2}$  inches; the diameter about  $4\frac{3}{4}$  inches and the thickness of the outer or exposed side is 2 inches.

The eggs are 3 in number of a greenish ashy, freckled with minute roseate specks, which become confluent and form a patch at the larger end; shape ordinarily and rather gracefully, ovate; diameter  $1\frac{6}{8} \times \frac{1}{8}$  inches.

The elevation at which the nests were found was from 4,000 to 4,500 feet, but the bird is common, except during the breeding season, at all elevations up to the snows, and in the winter it extends its range down into the Doon. In the breeding season it is found chiefly in the glens, in the retired depths of which it constructs its nest, it never, like the Thrushes and *Geocichla*, builds in trees or bushes but selects some high towering and almost inaccessible rock forming the side of a deep glen, on the projecting ledges of which, or in the holes from which small boulders have fallen, it constructs its nest; and where unless when assailed by man, it rears its young in safety, secure alike from the howling blast and the attacks of wild animals. It is known to the natives by the name of “*Kuljeet*” and to Europeans as the “Hill Black bird.”

The situation in which the nest is placed is quite unlike that of any other of the Hill Thrushes with which he was acquainted, and the habits of the bird render it far more deserving of the name of *Petrocossyphus* or “Rock black-bird” than those to which, in the Catalogue of Mr. Hodgson’s Collection, Mr. Gray has assigned that name. Indeed, as applied to the two preceding species, it is altogether a misnomer, for they are, in the first place—not Blackbirds or *Merulae*, as the Greek word “*Cossyphus*” implies,—and in the second place, they are not Rock lovers at all, but true forest birds, building in trees and taking their food upon the ground, where they find it in berries and insects among the withered leaves which they expertly turn over with their beaks, and hence the reason why the beak is almost invariably clogged with mud or other dirt. He had never seen these *Geocichlae* except in woods,—whereas “*Myophonus Temminckii*” is as often found in open rocky spots on the skirts of the forest, as among the woods, loving to jump upon some stone or rocky pinnacle from whence he sends forth a sort of choking chattering song, if such it can be called—or with a jerk of the tail, hops away with a loud musical whistle, very much after the man-

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On the southern side of the range at Jerrepancee, elevation about 5,000 feet, the forest is open and scattered among immense bare blocks of stone;—on the northern side of the same range, the forest is dense and contains much underwood. It is remarkable that while the *Geocichla* above noticed, are strictly confined to the close forest tracts of the northern side,—*Petrocossyphus cinclorhynchus* (Gray's Cat.) affects the rocky southern forest; he had however occasionally seen the latter on the northern side also, but he cannot call to mind a single instance in which he had seen either *Geocichla citrina* or *G. unicolor* on the southern side. This fact will at once show how little applicable to the latter birds is Mr. Gray's name of *Petrocossyphus*. Mr. Gray may possibly reply to this criticism by asking—"what's in a name?" To which Captain Hutton responds that in natural history, as with man, a good name is most important, and ought as much as possible to convey some idea of habits, manners or markings so as to assist the naturalist not only in the identification of species, but also lead him to the places where he might expect to find them. But who would ever dream of seeking in the forests gloom for birds whose name pointed to the fact of their delighting in rocky situations? Yet, if misled by the generic name *Petrocossyphus*, the naturalist should venture to some rock bestudded mountain in search of the species "*citrinus*" and "*unicolor*"—he would have nothing but his trouble as his reward, for those species are procurable only amidst the boughs and thickets of the forest.

No. 26.—"*Copsychus saularis*," (L.)

*Gryllivora intermedia*, Swainson.

*Dahila docilis*, Hodgson.

Arrives on the hills up to 5,000 feet and perhaps higher, in the beginning of April. It returns to the Doon and plains in early autumn. It breeds in May, on the 19th of which month he took a nest from a bank by the road side; it was composed of green mosses and lined with very fine roots, Eggs 4; carneous green colour somewhat blistered at the larger end. Diameter  $\frac{1}{8} \times \frac{9}{16}$  inches.

This species delights to sit on the topmost branches of a tree, generally selecting some dry and leafless branch, from whence it utters a pleasing song, which is replied to by another individual at no great distance, when on the ground it hops with the wings half open or drooping, and at each hop it stops to spread and flit the tail.

No. 27.—"*Stoparola melanops*," (Blyth.)

*Nittava melanops*, (Gray's Cat.)

*Muscicapa melanops*, (Vigors, Gould.)

This is a common species throughout the mountains up to about 12,000 feet during summer arriving about the beginning of March. It breeds in May and June, making a neat nest of green moss in holes of trees, in stumps, and in

the holes of banks by the road side. The eggs are 3 to 4 in number, dull white with faint rufous specks at the larger end and somewhat inclined to form a ring.

The bird has a pleasing song. Gould figures this species very faultily,—as the black of the lores does not pass beyond the eye, as he represents it, and the under tail coverts instead of being uniform pale greenish, are dull blue, greenish, feathers apically barred with dull white. In the winter it leaves Mussooree.

No. 28.—"*Leyornis rubeculoides*," (Blyth.)

*Nittava rubeculoides*, (Hodg.)

*Phænicura rubeculoides*, (Vigors.)

*Chaitaris brevipes*, (Hodg.)

Arrives in the neighbourhood of Mussooree in April, and breeds in June, on the 13th of which month he took a nest from a hole in a bank by the road side in a retired and unfrequented situation. He afterwards found another nest in a hole of a rock, also in a retired spot. The elevation was about 5,000 feet. Externally this nest is composed of green moss and lined with black fibrous lichens like hair. The eggs are 4 in number, of a dull and pale olive green, faintly or indistinctly clouded with dull rufous or clay colour. Diameter  $\frac{1}{8} \times \frac{9}{16}$  inches. The male has a very pleasing song which he warbles forth from the midst of some thick bush, seldom exposing itself to view, like *Stoparola melanops* which delights to perch upon some high exposed twig.

No. 29.—"*Sibia capistrata*," (Hodg.)

Remains at an elevation of 7,000 feet throughout the year, but he never saw it under 6,500 feet. Its loud ringing note of litteree—litteree tweeyo, quickly repeated, may constantly be heard on wooded banks during summer. It breeds at Mussooree in May, making a neat nest of coarse dry grasses as a foundation, covered laterally with green moss and wool, and lined with fine roots. The number of eggs he did not ascertain, as the nest was destroyed when only one had been deposited, but the colour is pale bluish white freckled with rufous. The nest was placed on a branch of a plum tree in the botanical garden at Mussooree.

No. 30.—"*Dierurus longicaudatus*," (A. Hay.)

This species, the only one that visits Mussooree, arrives from the Doon about the middle of March and retires again about September. It is abundant during the summer months, and breeds from the latter end of April till the middle of June, making a very neat nest, which is placed in the bifurcation of a horizontal branch of some tall tree, usually oak trees, it is constructed of grey lichens gathered from the trees, and fine seed-stalks of grasses, firmly and neatly interwoven, with the latter it is also usually lined, although sometimes a black fibrous lichen is used;—externally the materials are kept compactly together, by being plastered over with spiders



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webs. It is altogether a light and elegant nest. The shape is circular, somewhat shallow and diameter within 3 inches. The eggs are 3 to 4, —generally the latter number and so variable in colour and distribution of spots, that until he had shot several specimens and compared them narrowly he was inclined to think they had more than one species of *Dicurus* there. He is however now fully convinced that these variable eggs belong to the same species. Sometimes they are dull white with brick red spots openly disposed in form of a rude ring at the larger end; at the other times the spots are rufescent claret with duller indistinct ones appearing through the shell; others are of a deep caraneous hue, clouded and coarsely blotched with deep rufescent claret; while again some are faint caraneous with large irregular blotches of rufous grey with duller ones beneath the shell. Diameter varying from  $1 \times \frac{1}{8}$ ; —to  $\frac{3}{4} \times \frac{1}{8}$  inches.

No. 31.—“*Campephaga fimbriata*.” (Fem.)

*Campephaga lugubris*. (Gray's Cat.)

*Ceblepyris lugubris* (Sundevall.)

*Volvocivora melaschistos* (Hodg. Gray.)

*Graucalus maculösus*, (McClelland.)

This too is a mere summer visitor in the hills, arriving up to 7,000 feet about the end of March, and breeding early in May. The nest is small and shallow, placed as in the last in the bifurcation of a horizontal bough of some tall oak tree, and always high up; it is composed externally almost entirely of grey lichens picked from the tree, and lined with bits of very fine roots or thin stalks of leaves, seen from beneath the tree, the nest appears like a bunch of moss or lichens, and the smallness and frailty would lead one to suppose it incapable of holding two young birds of such size. Externally the nest is compactly held together by being thickly pasted over with cobwebs. The eggs are two in number, of a dull grey green closely and in part confluent dashed with streaks of dusky brown. Diameter  $\frac{3}{4} \times \frac{1}{8}$  inches.

The bird has a plaintive note which it repeatedly utters while searching through a tree, after the manner of *Collurio Hardwickii*, for insects.

No. 32.—“*Abornis schisticeps*.” (Hodg.)

*Culicipeta schisticeps*. (Gray's Cat.)

*Phyllopneuste xanthoschistos*. (Hodg.)

A common species at 5,000 feet and commences building in March. A pair of these birds selected a thick China rose bush, trained against the side of the house, and had completed the nest and laid one egg when a rat destroyed it. He subsequently took two other nests in May, both placed on the ground in holes in the side of a bank by the road side. In form the nest is a ball with a round lateral entrance and is composed externally of dried grasses and green moss, lined with bits of wool, cotton, feathers, thread and hair. In one he recognized more than one lock of his own child's hair, which had been

cut not long before, and had been appropriated by the bird. The eggs are 3 in number and pure white. Diameter  $\frac{1}{2} \times \frac{1}{8}$  inches.

No. 33.—“*Cryptolopha cinereocapilla*.” (Vieillot.)

*Cryptolopha ceylonensis*. (Strick.)

*C. poiocephala* (Swain.)

*Platyrrhynchus ceylonensis*. (Swain.)

He took a nest of this species on the 18th April in a deep and thickly wooded glen at an elevation of about 4,500 feet. It was placed against the moss covered trunk of a large tree, growing by the side of a mountain stream, and was neatly and beautifully constructed of green moss fixed in the shape of a watch pocket at the head of a bed, to the mosses of the tree (with which it was completely blended,) by numerous threads of spiders' webs. The lining was of the finest grass stalks, no thicker than horse-hair, and beneath the body of the nest depended a long bunch of mosses fastened to the tree with spiders' webs, and serving as a support or cushion on which the nest rested securely. Within this beautifully constructed fabric were 4 small eggs of a dull white colour, with a faint olive tinge and minutely spotted with pale greenish brown, and having a broad and well defined ring of the same, near the large end. The eggs were set hard. Diameter  $\frac{1}{2} \times \frac{1}{8}$  inches. Shape bluntly ovate.

No. 34.—“*Parus erythrocephalus*.” (Vig.)

Common at Mussooree and in the hills generally throughout the year. It breeds in April and May. The situation chosen is various, as one taken in the former month at Mussooree, at 7,000 feet, was placed on the side of a bank among overhanging coarse grass, while another taken in the latter month at 5,000 feet, was built amongst some ivy twining round a tree, and at least 14 feet from the ground. It is in shape a round ball with a small lateral entrance, and is composed of green mosses warmly lined with feathers. The eggs are 5 in number, white with pinkish tinge, and sparingly sprinkled with lilac spots or specks, and having a well defined lilac ring, at the large end. Diameter  $\frac{1}{2} \times \frac{1}{8}$  inches.

No. 35.—“*Parus xanthogenys*.” (Vig.)

Common in the hills throughout the year. It breeds in April, in which month a nest containing four partly fledged young ones was found at 5,000 feet; it was constructed of moss, hair and feathers, and placed at the bottom of a deep hole in a stump at the foot of an oak tree; the colour of the egg was not ascertained.

No. 36.—“*Acrocephalus montanus*.” (Gray's Cat.)

*Salicaria arundinacea* (Hodg. Gray.)

This species arrives in the hills up to 7,000 feet at least in April, when it is very common; and appears in pairs with something of the manner of *Phylloscopus*. The note is sharp “*tchik-tchick*,” resembling the sound emitted by a flint

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and steel. It disappears by the end of May, in which month they breed, but owing to the high winds and strong weather experienced in that month in 1848, many nests were left incomplete, and the birds must have departed without breeding. One nest which he took on the 6th May, was a round ball with lateral entrance; placed in a thick barberry bush growing at the side of a deep and sheltered ditch; it was composed of coarse dry grasses externally and lined with finer grass. Eggs 3, and pearl white, with minute scattered specks of rufous, chiefly at the large end; diameter  $\frac{1}{8}$  ×  $\frac{1}{8}$  inches. The high winds which prevailed in May, destroyed an incredible number of the nests of various doves, *Treron sphenura*, *Garrulus lanceolatus*, &c.)

No. 37.—“*Zosterops palpebrosus*.” (Temm.)

*Z. annulosus*. (Swain.)

*Motacilla madagascariensis*. (Gm.)

*Sylvia madagascariensis*. (Lin. Lath.)

*Motacilla maderaspatana*. (Lin.)

*Sylvia palpebrosa*. (Tem.)

*S. leucops*. (Vieillot)

*S. annulosa*. (Swain.)

*Zosterops maderaspatana*. (Gray's Cat.)

These beautiful little birds are exceedingly common at about 5,000 feet during summer, but he never saw them much higher. They arrive from the plains about the middle of April, on the 17th of which month he saw a pair commence building in a thick bush of *Hybiscus*? and on the 27th of the same month the nest contained 3 small eggs, hard set. He subsequently took a second from a similar bush, and several from the drooping branches of oak trees, to the twigs of which they were fastened. It is not placed on a branch, but is suspended between two thin twigs, to which it is fastened by floss silk torn from the cocoons of “*Bombyx Huttoni*” (Westwood) and by a few slender fibres of the bark of trees or hair, according to circumstances. So slight and so fragile is the little oval cup, that it is astonishing the mere weight of the parent bird does not bring it to the ground; and yet within it three young ones will often safely outride a gale that will bring the weightier nests of Jays and Thrushes to the ground. Of seven nests then before him, four were composed externally of little bits of green moss, cotton, seed down, and the silk of the wild mulberry moth torn from the cocoons, with which last material moreover, the others appear to be bound together; within, the lining of two is of the long hairs of the Yak's tail (*Bison peophagus*) two of which died on the estate where these nests were found, and the third is lined with black human hair; the other three are formed of somewhat different materials, two being externally composed of fine grass stalks, seed down and shreds of bark, so fine as to resemble tow; one is lined with seed down

and black fibrous lichens resembling hair, another is lined with fine grass, and a third with a thick coating of pure white silky seed down. In all the seven the materials of two sides are wound round the twigs, between which they are suspended like a cradle, and the shape is an ovate cup about the size of half a hen's egg split longitudinally. The diameter and depth are respectively  $2 \times \frac{3}{4}$ ; and  $1\frac{1}{2}$  inches. The eggs usually 3 in number, of a very pale whitish green; diameter  $\frac{5}{16} \times \frac{5}{16}$  inches. The young continue with the old birds for some time. After leaving the nest, and are often mixed up with the flocks of *Parus erythrocephalus*. They appear to feed greedily upon the small blackberries of a species of *Rhamnus* common in these localities. They depart from the Doon about the end of October.

No. 38.—“*Orthotomus longicauda*.” (Gm.)

*O. Bennettii*. (Sykes.)

*O. Suthorius*, *V. ruficapillus*, *V. sphæmura*. (Hodg. Gray.)

• *Motacilla longicauda*. (Gm.)

*M. Sutoria*. (Gm.)

*Sylvia guzuratta*. (Lath.)

*O. lingoo*. (Sykes) Young.

*O. Sepium*. (Sykes) Young apud Blyth.

*O. sphæmurus*. (Swain.)

*Sylvia ruficapilla*. (Hutton.)

It is very evident from the accounts given both by Mr. Hodgson and Captain Tickell, of the colour of the eggs of supposed *O. longicauda*, that there must either be more than one species confounded under that name, or that they have erroneously attributed to it the eggs of some other species. In the J. A. S. No. 22 for October 1833, he described the nest and eggs of the true *O. longicauda*, under the name of *Sylvia ruficapilla*, and similar nests and eggs agreeing in every respect have since fallen under his observation; in all of these the nest was composed of cotton, wool, vegetable fibre and horsehair, formed in the shape of a deep cup or purse enclosed between two long leaves, the edges of which were sewed to the sides of the nest in a manner to support it, by threads spun by the bird, the eggs are 3 to 4, of a white colour, sprinkled with small specks, chiefly at the larger end, of rufous or tawny. Captain Tickell gives the eggs “pale greenish blue, with irregular patches, especially towards the larger end, resembling dried stains of blood, and irregular broken lines scratched round, forming a zone near the large end.” These cannot be the eggs of *O. longicauda*, any more than the “unspotted verditer blue eggs” mentioned by Mr. Hodgson, P. Z. S. 1845. p. 29.

The true *O. longicauda* occurs in the Doon along the southern base of the mountains, but does not ascend even in summer.

No. 39.—“*Drymoica criniger*.” (Hodg.)

• *Suya criniger*. (Hodg.)

This little bird appears on the hills at about



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5,000 feet in May. A nest taken much lower down on 22nd June was composed of grasses neatly interwoven in the shape of an ovate ball, the smaller end uppermost and forming the mouth entrance, it was lined first with cottony seed down, and then with fine grass stalks; it was suspended among high grass and contained 5 beautiful little eggs of a caraceous white colour, thickly freckled with deep rufous, and with a darkish confluent ring of the same at the large end. Diameter  $1\frac{1}{8} \times \frac{5}{16}$  inches. I have seen this species as high as 7,000 feet in October. It delights to sit on the summit of tall grass or even of an oak, from whence it pours forth a loud and long continued grating note, like the filing of a saw.

No. 40.—“*Pyrgita indica*” (Jard. Selb.)

This if really distinct from the European Sparrow, does not appear to be a common bird on the heights, nor is it nearly so common at 5,000 feet as it is in the Doon yet it cannot be called scarce. It breeds in the eaves of buildings and in bushes, making a loose slovenly nest of a round form with lateral entrance; it is of large size and constructed chiefly of dry grasses, or hay externally, and plentifully lined with feathers, bits of cotton and wood. The eggs are pale ash colour, moderately sprinkled with specks and dashes of neutral tint, clustering rather thickly at the large end. Diameter  $1\frac{3}{8} \times \frac{9}{16}$  inches. Eggs usually about 6 in number. Breeds several times in the year.

No. 41.—“*Francolinus vulgaris*.” (Steph.)

This is a common bird in the Doon, and by no means rare in warm cultivated valleys far in the hills; it breeds in the hills in June, and a nest taken by a friend on whose accuracy he can rely, and who shot the old bird, contained 6 eggs of a dull greenish white colour, the egg appears very large for the size of the bird, and tapers very suddenly to the smaller end. Diameter  $1\frac{1}{2} \times 1\frac{3}{16}$  ins.

There is no preparation of a nest, the eggs being deposited on the bare ground. Called “Kala teetur” by the natives.

No. 42.—“*Euplocomus albocristatus*.” (Vigors.)

This species, the “Kaliep” of the hill men, is found in the hills at all seasons, and is common at every elevation up to the snows. It breeds in May and June. In the latter month he found a nest, by the side of a small water course, composed merely of a few dead leaves and some dry grasses, which had probably been accumulated by the wind and tempted the bird to deposit her eggs upon them. The spot was concealed by large overhanging ferns, and contained the shells of 8 eggs of a sullied or faint brownish white like some hen’s eggs; the tops of all were neatly cut off as if by a knife, showing that the young ones had escaped, and singular enough he had the day before captured the whole brood, but knowing

the almost impossibility of rearing them had allowed them again to go free. The diameter of the egg is  $2 \times 1\frac{5}{16}$  inches.

• In Mr. Gray’s Catalogue of the Collection presented to the British Museum by Mr. Hodgson, this and *Phasianus Hamiltonii* are given as synonymes of *Gallophasis leucomelanos*. In this there appears to be some degree of error, for the species are distinct. Mr. Blyth in epistola, writes that “there are 4 true races and 2 hybrids. Of the former, one is *albocristatus*; crest rarely very white, the white on the rump always well developed, and found exclusively westward of Nipal. *Melanotus* (Blyth), has black crest, and no white on rump; common at Darjeeling; and the Nepalese *leucomelanos* is certainly a cross between these two. *Cuvieri* of Assam, Sylhet, &c. has white on rump; but underparts wholly shining black; and this has produced a mixed race with *lineatus* of Arracan. If such be the case, the name of *leucomelanos*, belonging only to a true species, must give place to Gould’s name of *albocristatus*. *Phasianus Hamiltonii* of Gray’s III. Ind. Zool. looks very like an immature hybrid. In the neighbourhood of Mussooree and Simla, we have only *Euplocomus* (*Gallophasis*) *albocristatus* (verus) the others all occurring more to the westward as correctly observed by Mr. Blyth. The long white crest is seldom or perhaps never found except in fully mature birds, it being generally of a dirty or dusky hue like that figured in Gould’s Century, every place however is now so thoroughly poached over by native Shikarrees, that an old white crested bird is extremely rare.

No. 43.—“*Pucrasia macrolopha*.” (Gray’s Cat.)

*Phasianus pucrasse*. (Gray Griff, An King.)

*Gallophasis pucrasia*. (Hodg, Gray.)

For the eggs of this species he was also indebted to a friend who took them in June from the ground, where there was no other symptom of a nest than a slight scratching away of the leaves and grass. The eggs were 5 in number, of a sandy brown, sprinkled over with specks, and large spots and blotches of deep red brown resembling dried blood. The diameter was  $2\frac{1}{16} \times 1\frac{7}{16}$  inches. Shape ordinary, and altogether a very close miniature of the egg of *Lophophorus impeyanus*. This bird occurs in the hills at all seasons, from Mussooree to the snows, and bears several names, such as “Plass” at Simla, “Koklass,” at Mussooree, and “Pocrass” farther to the eastward.

No. 44.—“*Phasianus Wallichii*.”

*Lophophorus Wallichii*. (Hardw.)

*Phasianus Stacei*. (Vigors.)

This beautiful species is truly a hill bird being found at all seasons. Its egg is pure white and of the ordinary shape, but the number not ascertained. It is known as the “Cheer,” and “Buncheel.”

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No. 45.—“*Lophophorus Impeyanus*.”  
*Phasianus Impeyanus*. (Lath.)  
*L. refulgens*. (Temm.)

These birds do not occur so low down as Mussooree, but are found in abundance on the next range. In days of yore they were found at Simla, but civilization has of late years banished them to the less disturbed localities. It makes no nest, but lays its eggs on the ground, the number not satisfactorily ascertained, as one nest contained 3 and another 4 eggs of a pale brown or sandy hue, thickly sprinkled over with reddish brown spots and dashes.

The diameter  $2\frac{1}{2} \times 1\frac{1}{8}$  inches. Shape ordinary, called “Monaul.”

No. 46.—“*Tragopan Hastingsii*” (Vigors.)

A pair of these birds kept in confinement produced 2 eggs in June, both of which were destroyed by the male; the colour was pale rufous brown like what are usually termed in (India) “game hen’s eggs.” These birds are only found on the loftier hills along the confines of the snow. They lived contentedly in confinement and became exceedingly tame. In the catalogue above referred to, Mr. Gray gives *Satyra melanacephala* of Hardwick’s III Ind. Zool. Plates 46, 47, 48, as synonymous with Gould’s *Tragopan Hastingsii*. This is again erroneous, for the plates quoted, unless intended as caricatures, can never represent *T. Hastingsii* in any state of plumage. Plate 46 gives what is termed “the adult male” and although agreeing pretty well in other respects with *T. Hastingsii*, it is represented with “Ochreous yellow wattles” whereas in living specimens of the latter species, the wattles are of a bright metallic ultramarine blue; those on the head are usually concealed beneath the feathers, and are only occasionally erect when the bird is excited, but never erected as represented in plate 46. Again Plate 47 represents no phase of plumage of *T. Hastingsii*, while Plate 48 purporting to be a female, is in all probability the young male of some other species, but is assuredly not the female of *T. Hastingsii* which is correctly figured by Gould in his *Century of Himalayan Birds*; a comparison of his plate with that of Mr. Gray’s III. Ind. Zool. will, he thinks, be sufficient to convince any one of the total distinctness of the birds represented. He therefore rejects Gray’s Synonymes in toto, and retains *T. Hastingsii* as an undoubtedly good species, peculiar to the snowy regions of the North Western Himalaya; while *Satyra melanacephala*, if it be a species at all, must be sought for farther to the Eastward of the range. At Simla called, “Jahjee;” Mussooree “Jwire;” by Europeans the “Argus Pheasant.”

Mr. Bligh doubts altogether the existence of more than two Himalayan species of this genus, *Hastingsii* in the N. W., and *Cornutus* in the S. W. A third exists is the Chinese *Temminckii*;

and fine specimens of all are in the Society Museum.—*Capt. Hutton, in Ben. As. S. Journ.*

It will have been observed in the above remarks of Captain Hutton, how numerous the birds of India flit from one locality to another, with the changing seasons. The great Migration of Birds to and from Southern India Asia, seems to take place across the mountains of Nepal.

The wading and natatorial birds, generally, make a mere stage of the valley, on their way to and from the vast plains of *India* and *Tibet*, the valley being too small, dry, open, and populous for their taste—especially that of the larger ones. Some, however, stay for a longer or shorter time, in their vernal and autumnal migrations: and some, again, remain throughout that large portion of the year in which the climate is congenial to their habits. Of all of them, the seasons of arrival, both from the north and from the south, are marked with precision; and Mr. Hodgson was led to conclude from what he observed there, that the mass of the gallatores and swimmers are found in the plains of India, only during the cold months: for they all arrive in the valley of *Nepal*, from the north, towards and at the close of the rains; and all as regularly re-appear from the south, upon, or soon after the cessation of the hot weather. In his enumeration of them, therefore, he divides the birds into the three classes, below indicated.

1st.—Of such as usually pass over the valley, seldom alighting, and only for a few hours.

2nd.—Of such as alight and stay for a few days; or, at most, weeks.

3rd.—Of such as seem to seek the valley, not as a caravansary merely, or house of call, for momentary or temporary sojourn in, on their way to some remote abode—but, as their permanent dwelling place for the entire season.

A 4th class will be constituted of such as do not appear to migrate at all; notwithstanding that all their nearest kindred (so to speak) do so regularly.

Class I. embraces,

Order NATATOIRES. Family *Anatidæ*; the Genera *Cygnus* and *Anser*: Family *Colymbidæ*, none; Family *Alcadæ*, none. Family *Pelecanidæ*; the Genera *Phalacrocorax* and *Pelecanus*, Family *Laridæ*; the Genera *Sterna*, *Viralva*, and *Larus*.

Order GRALLATOIRES. Family *Gruidæ*; the Genus *Grus*. Family *Ardeidæ*; the Genera *Ardea*, *Phenicopterus*, *Platalea*, *Ciconia*, *Mycteria*, *Anastomus*, *Tantalus*. Family *Scolopacidæ*, none. Family *Rallidæ*, the Genus *Glareola*. Family *Charadriadæ*, the Genera *Himantopus* and *Oedicnemus*.

Class II. embraces,

Order NATATOIRES. Family *Anatidæ*; the following Genera, *Tadorna*, *Anas*, *Hynchaspis*, *Dafila*, *Mareca*, *Querquedula*, *Merganser*, *Tringula*. Family *Colymbidæ*, none. Family *Alcadæ*



none. Family *Pelecanidae*; the Genera *Phalacrocorax* and *Pelecanus*.

Order GRALLATORES. Family *Gruidae*; the Genus *Anthropoides*. Family *Ardeidae*, the Genus *Ibis*. Family *Scolopacidae*; the Genera *Numenius*, *Limicola*, *Recurvirostra*, *Limosa*, *Rhynchæa*, *Pelinda*, *Phæopus*. Family *Rallidae*; the Genera *Rallus*, *Parra*, *Gallinula*, *Porphyrio*, *Fulica*. Family *Charadriidae*; the Genera *Fregia*, *Squatarola*, *Vanellus*, *Charadrius*.

Class III. embraces,

Order NATATORES. Family *Anatidae*; the Genera *Mareca* and *Querquedula*, (where *protected*, as in some sacred tanks). Family *Colymbidae*, none. Family *Alcedæ*, none. Family *Pelecanidae*, none.

Order GRALLATORES. Family *Gruidae*, none. Family *Ardeidae*, the Genera *Botaurus*, *Ardea*, *Ciconia*. Family *Scolopacidae*, the Genera *Gallinago* and *Scolopax*. Family *Rallidae*; the Genera *Parra*, *Rallus*, and *Fulica* (where *protected* in holy tanks). Family *Charadriidae*; the Genus *Charadrius*, (one small species of.)

Class IV. embraces,

Order NATATORES, none.

Order GRALLATORES. Family *Gruidae*, none. Family *Ardeidae*; the Genera *Ardea*, (small species, or *Baklas*, only) and *Nycticorax*. Family *Scolopacidae*; the Genera *Totanus*? and *Gallinago*? Family *Rallidae*; the Genus *Rallus*. Family *Charadriidae* the Genus *Vanellus*, one species—the *Tithirs*.

N. B.—The notes of interrogation merely denote a doubt whether the Genera so indicated belong to Class III. or IV.

*Remarks upon the above enumeration.*

The Grallatorial and Natatorial birds begin to arrive, from the *North*, towards the close of August, and continue arriving till the middle of September. The first to appear are the common snipe, and jack snipe, and *Rhynchæa*; next, the Scolopaceous waders (except the wood-cock;) next, the great birds of the heron and stork, and crane families; then, the Natatores; and lastly, the woodcocks, which do not reach us till November. The time of the re-appearance of these birds, from the *South* is the beginning of March; and they go on arriving, till the middle of May. The first which thus return to Nepaul are the snipes; then come the teal and ducks; then the large Natatores; and lastly, the great cranes and storks. It will be noticed that the Grallatores which visit Nepaul, or pass over it, are much more numerous than the Natatores; and, he was of opinion that observation in the plains of India would satisfactorily prove that this is a just and decisive indication of the superior prevalence of wading over swimming birds in that extensive region. India, as he supposes is too hot for the taste of the Natatores—a great majority of which seem to affect arctic regions,

or, at least, high latitudes: The wild swan was never seen there but once, in the mid winter of 1828, when the apparition suggested a new version of the well known hexameter.—

‘Rara avis in terris, *alboque* simillima cygno.’

Such a bird is never seen, he supposes in the plains of India?

None of the Natatores stay in Nepaul beyond a week or two, in autumn, (when the rice fields tempt them) or beyond a few days, in spring, *except* the teal, the widgeon, and the coot, which remain for the whole season, upon some few tanks whose sanctity precludes all molestation of them. There are cormorants throughout the season upon the larger rivers within the mountains; but none ever halt in the valley, beyond a day or two: for *so long*, however, both they and pelicans may be seen, occasionally, on the banks just mentioned.

The *Larus* and *Sterna* are birds which usually affect the high seas,—but Mr. Hodgson, had killed both the red-legged Gull, and a genuine pelagic Tern, in the valley of Nepaul. But so had he *fishing* Eagles; and in truth who shall limit the wanderings of these long-winged birds of the *Ethereal* expanse? Mr. Hodgson, in *Asiatic Transactions—Vol. 18 Part ii. for 1838, page 124.*

It will be seen from the above how extended are the wanderings of many of the birds of Southern Asia. This is a subject, indeed, which has been the theme of poets and Naturalists in all ages.

*The Migration of Birds* engaged the pen of Mrs. Hemans, who asks,

Birds, joyous birds of the wandering wing,  
Whence is it ye come with the flowers of spring?

“We come from the shore of the green old Nile,  
From the land where the roses of Sharon smile,  
From the palms that wave through the Indian sky,  
From the myrrh-tree of glowing Araby.

“We have swept o’er the cities, in song renown’d,  
Silent they lie, with the deserts round!  
We have crossed proud rivers, whose tide hath roll’d,  
All dark with the warrior blood of old;  
And each worn wing hath regained its home,  
Under the peasant’s roof-tree, or monarch’s dome.”

And what have ye found in the monarch’s dome,  
Since last ye traversed the blue sea’s foam?

“We have found a change, we have found a pall,  
And a gloom o’ershadowing the banquet’s hall,  
And a mark on the floor, as of life-drops spilt,  
Nought looks the same, save the nest we built!”

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Sad is your tale of the beautiful earth,  
Birds that o'ersweep it in power and mirth!  
Yet, through the wastes of the trackless air,  
Ye have a guide, and shall we despair?  
Ye over desert and deep have passed,  
So shall we reach our bright home at last!

*The Migration of Swallows* from the cold regions of the North, has ever been a fertile theme of wonder, and one poet thus alludes to it.

"As fables tell, an Indian sage,  
The Hindostani woods among,  
Could in his desert hermitage,  
As if 't were marked in written page,  
'Translate the wild bird's song.

"I wish I did his power possess,  
That I might learn, fleet bird, from thee,  
What our vain systems only guess,  
And known to what wide wilderness,  
You go across the sea."

The following birds are given in the Calcutta Review (March 1857), as common to England and Southern Asia. We must regard it as from the pen of Mr. Blyth, as there is no naturalist other than him in India equal to the task.

(246) *Gyps Fulvus*. (*Vultur fulvus*; 'Griffon Vulture.') Inhabits the high mountains of Europe and Asia, inclusive of the Himalaya and its vicinity: common in Dalmatia, Greece, and the islands of the Mediterranean; less so on the Alps, and exceedingly rare and accidental in the British islands and northern provinces of France. Replaced in the Pyrenees, Sardinia, and Barbary, by the nearly affined *G. occidentalis*: in E. Africa by *G. Ruppellii*: and in S. Africa by *G. Kolbii*; also generally over India and the Malay countries by *G. indicus*, a much smaller bird. All are remarkable for possessing fourteen tail-feathers, whereas other birds of prey have twelve only; even their congener, *G. bengalensis*, which is the commonest Indian Vulture about and near towns, and is also met with in E. Africa. As Mr. Yarrell does not appear to discriminate the *G. occidentalis*, it is just possible that the bird which he notices appertains to that particular race, rather than to the genuine *G. fulvus* of the Himalaya.

The *G. fulvus* is the 'great white Vulture' of the Himalaya; and the 'great black Vulture' of the Himalaya, *Vultur monachus*, may yet be found to stray so far west as Britain; since it has several times been shot in Schleswig and Holstein, also in Provence, Languedoc, Dauphiné, &c. It is not rare in the Pyrenees, Sardinia, Sicily, and mountainous regions of the S. E. of Europe.

The great African *V. auricularis* has been observed in Greece, and has once been killed in France (in Provence); this resembles *V. ponticerrianus*, the so called 'King vulture' common over the plains of India, but is much larger, equalling *V. monachus* in size; while the latter

has also an analogous diminutive in Africa, in the *V. occipitalis*.

(247) *Neophron Percnopterus*. ('Egyptian Vulture') *Rachamah* of the appendix to Bruce's travels; *Pharaoh's chicken*, &c. Inhabits Europe, Asia, and Africa, abounding in most warm regions; very common on the plains of Upper Hindustan, and the table-land of peninsular India; but not observed in Lower Bengal below the tideway of the Gangetic rivers: common in the southern parts of Europe; but very rare and accidental in the British islands, and also in Scandinavia. This bird is evidently the 'Kite' of Major A. Cunningham's 'Ladak' (p. 205). He writes—"the eagle (*cha-nak*, or the 'black bird') and the kite (*chakor*, or the white bird) are common enough, and so is the large raven." A second species of this genus, the *N. pileatus*, inhabits Africa only.

(248) *Gypaetos*. The Lämmergeyer (*Gypaetos*) inhabits the high mountains of Europe, Asia and Africa; from the Altai even to the Cape colony. Authorities differ with respect to the value to be attached to certain differences observed in specimens from different regions. The prince of Camino identifies the Himalayan with *G. barbatus* of Gebler from the Altai, and *G. nudipes* of Brehm (*meridionalis* of Keyser and Blasius) from S. Africa. M. Malherbe remarks that specimens from the Pyrenees and Sardinia are of inferior size to those from the Swiss Alps; and this smaller race is the *G. barbatus occidentalis* of Schlegel. Even the Himalayan is said to differ from that of eastern Europe by having a pictorial dark band not observed in the other, and is the *G. hemachalanus* of Captain Hutton. The constancy of the alleged distinctions seems to need confirmation, preparatory to an estimation of their value. The Himalayan bird is commonly mis-called 'Golden Eagle' by English residents.

(249) *Aquila Chrysaetos* ('Golden Eagle') Inhabits the mountainous regions of Europe, Asia, and N. America (being the only true *Aquila* in the New World); rare in N. Africa; and in India confined to the Himalaya. M. Degland inclines to the opinion that a larger and smaller race exist, the former inhabiting a colder region; but this much needs confirmation. We can perceive no difference between British and Himalayan examples.

(250) *Aquila mogilnik* or 'Imperial Eagle' of Temminck (*Aq. heliaca*, Savigny) inhabits generally a warmer climate than *Aq. Chrysaetos*, and is extensively diffused over the mountainous regions of S. E. Europe, Asia, and N. Africa, including those of India (being the *chrysaetos* of Dr. Jerdon's Catalogue of the birds of S. India). In Europe it has been observed so far north as in Jutland; but never in the British islands,



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(246) *Aquila naevia*. ('Spotted Eagle.') Inhabits Europe, Asia, and Africa; being common in the hilly parts of India, and even in the Bengal Sundarbans. Very rare in N. Europe: but has been shot near the town of Schleswig, and has even been known to breed in Ireland.

There are two affined species in India, *Aq. hastata*, nearly as large but less robust, and *Aq. fulvescens*, distinct from *Aq. naevioides* of Africa (the 'Wokhab' noticed in *Cyc. of India*), which is smaller and more robust, - a miniature of *Aq. mogilnik*. Neither of them has been observed in Europe.

(247) *Eutolmaetos fasciatus*. (*Falco Bonellii*, de la Marmor.) Inhabits the southern parts of Europe, with Asia, and N. Africa; being replaced in S. Africa by *Eu. bellicosus*: in India and Ceylon confined to the hilly parts, where far from rare.

(248) *Hieraetus pennatus*. Inhabits E. Europe, Asia, Africa, India generally, and Ceylon: differing very little (if at all) from *H. morphnoides* of Australia: a rare species in Europe. Prof. Schlegel doubts the proper *habitat* of this bird: it is not uncommon in India, preying much on domestic Pigeons.

(249) *Pandion haliaetus*. ('Osprey.') Of universal distribution; the Australian only differing but slightly. Common in India; and migratory in the far north.

(250) *Falco candicans*. (*Falco gyrfalco*; 'Gyr Falcon.') An Arctic species, very rare in temperate regions: the *Shangar* of Indian falconry seems to denote it, as a bird of excessively rare occurrence in the Punjab. Some writers separate from it an Icelandic race, either as a distinct species or variety, respecting which there is much difference of opinion.

(251) *Falco sacer*. Schlegel (*F. lanarius* apud Temminck and Gould), a very rare species in East Europe, seems to belong properly to Middle Asia, and occurs rarely in the Himalaya.

(252) *Falco lanarius*. Schlegel, an inhabitant of the South East of Europe, differs very slightly from the Indian *F. juggur*, Gray.

(253) *Falco peregrinus*. ('Peregrine Falcon.') Inhabits Europe, Asia, North Africa, if not also North and South America: the South African race smaller; and Australian *F. macropus* (*melanogenys* of Gould) very nearly affined. Common in India; also a nearly affined species, *F. peregrinator*, which resorts more to the hills, and is the *F. ruber indicus* of Aldrovand. Although the Indian and also the north American races are considered different from the European by some, we doubt the existence of any permanent distinction whatsoever.

(254) *Hypotriorchis subbuteo*. (*Falco subbuteo*; the 'Hobby.') All Europe, Asia and Africa; migratory: common in the Himalaya; rarer in S. India; a cold weather visitant in Lower Bengal, together with an affined species,

*H. severus*. Both are somewhat crepuscular in habit.

(255) *Erythropus vespertinus*. (*Falco rufipes*; the 'Red-footed Falcon.') Europe, Asia, and N. Africa: rare in Britain: not uncommon in India, in large flocks, which visit Lower Bengal during the rainy season.

(256) *Erythropus Cenchris*. (*Falco tinnunculoides* of Vieillot.) Resembles *E. vespertinus* in structure and habits and both appear to be exclusively insectivorous, seizing their prey on the ground and not habitually on the wing (like the 'Hobby'). Geographical range also similar, or nearly so; but this has not been known to stray into Britain. Both are migratory.

(257) *Tinnunculus alaudarius*. *Falco* (*tinnunculus*; the 'Kestrel.') All Europe, Asia, Africa, with the great Asiatic archipelago. Very common in India, sometimes in large flocks. The commonest bird of prey in England and France.

(258) *Astur palumbarius*. ('Goshawk') Europe, Asia, and N. Africa: rare in Britain; much commoner in Scandinavia, and generally over Europe, where migratory: common in the Himalaya.

(259) *Accipiter nisus*. ('Sparrow-hawk.') Europe, Asia, and N. Africa: common in the hilly parts of India; rare in the plains, where abundantly replaced by *micronisus badius*. Migrates partially in northern regions. There is a nearly affined race in the Malay countries, *Acc. nisoides*, distinguished by having a white throat with three distinct dark stripes, and no rufous on the under-parts of the adult male. In other respects, quite similar to *Acc. nisus*; and by no means to be confounded with *Acc. virgatus*, which likewise has the throat-stripes.

(260) *Buteo vulgaris*. ('Common Buzzard.') Europe, N. Africa, Asia Minor: higher mountains of India; being common in the W. Himalaya, rare in the Nilgiris, and replaced on the plains by *B. canescens*. Rare, and to the northward and far west only, in America: mostly migratory in Scandinavia.

(261) *Pernis apivora*. ('Honey Buzzard') Europe, Asia, N. Africa: migratory. In India common (if identically the same), in addition to *P. cristata*. In the crestless or sub-crested Indian specimens (adults), there is a marked tendency to the development of three dark stripes on a white throat, and in the *Astur trivirgatus* and sundry other Indian species. Can such be of a hybrid race between *P. apivora* and *P. cristata*?

(262) *Circus aeruginosus*. ('Marsh Harrier.') Europe, Asia, N. Africa: very common in India. Migrates in Scandinavia.

(263) *Circus cyaneus*. ('Hen Harrier.') Europe, Asia, Africa: the American *C. Uliginosus* barely if at all, separable. In India common in the Sub Himalaya region and

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its vicinity: being replaced southward by *C. Swainsonii* (*Pallidus* of Sykes.)

(264) *Circus cineraceus*. (*C. Montagu*; *Montagu's Harrier*.) Europe, S. Asia, Africa: very common in India.

(265) *Circæetus gallicus* is a bird of South Europe, Asia, and Africa, which is common in India, and has been killed in Denmark; but never in the British Islands.

(266) *Bubo maximus*. ('Eagle Owl.') Europe, Siberia, China, Asia Minor, Babylonia, Barbary; Himalaya? If so, very rare.

(267) *Scops aldrovandi*. ('Scops eared Owl.') Europe, Asia Minor, N. Africa: migratory. In India replaced by affined species; more especially *Sc. bekkamœna* (*the Scops sunia et pennata* of Hodgson) which seems to be generally diffused over the country. *Sc. Aldrovandi* is admitted in the Catalogue of species from Nepal and Tibet presented to the British Museum by Mr. Hodgson; but referring doubtless to a grey specimen of the *bakkamœna*. Gradations from the grey to the chesnut-coloured varieties of *Sc. bakkamœna* may be seen in the museum of the Asiatic Society, Calcutta.

(268) *Asio otus*. (*Otus vulgaris*; 'Long-eared Owl.') Europe, N. Africa, Asia Minor, N. Asia, N. America: in India, confined to the Himalaya, where not uncommon.

(269) *Asio brachyotus*. (*Otus brachyotus*; 'Short-eared Owl') Europe, Asia, Africa N. and S. America: migratory. Common in India.

(270) *Syrnium aluco*. (*S. stridulum*; 'Tawny Owl') Europe, N. Africa, Asia Minor, N. Asia to Japan (Temminck). *S. nivicolus*, common in the W. Himalaya, rarer eastward, is barely separable.

(271) *Athene psilodactyla*. (*Noctua passerina*; 'Little Owl.') Europe, N. Africa, W. Asia, Afghanistan, N. W. Himalaya. A much larger species than the true *Ath. passerina* (*Strix acadica* of Temminck) of N. Europe, which has not been observed in the British Islands.

(272) *Turdus viscivorus*. ('Missel Thrush.') Europe, W. Asia: its representative in the W. Himalaya appears to be constantly a little larger and has more of the whitish hue upon the outermost tail-feathers; upon which slight differences, M. Homeyer distinguishes it by the name *T. Hodgsoni*.

(273) *Oreocincla Whitei*. (*Turdus Whitei*; 'White's Thrush.') A Siberian species, according to the Prince of Canino, with 14 tail-feathers! Distinct from the very similar *O. dama* of India (from the Hindustani word *Dama*, equivalent to 'Thrush'), with which it has been supposed identical.

(274) *Turdus pilaris*. ('Fieldfare.') Europe, W. Asia: migratory. One specimen has been killed at Saharunpur. In the Himalaya generally, replaced by *T. atrogularis*, a com-

mon bird of N. Asia, which occasionally strays into Europe and has been obtained so far west as in Denmark; in this country it occurs sparingly in Lower Bengal during the cold season. *T. fascatus* of Pallas (*Naumanni* of Temminck), another species inhabiting Siberia and Japan, and straying rarely into Europe, has been once obtained in Nepal.

(275) *Turdus iliacus*. ('Redwing') Europe, W. Asia, Barbary; has been observed in large flocks in Kohat. Migratory: breeding in the extreme north.

(276) *Turdus merula*. ('Blackbird.') Europe, W. Asia, N. Africa, Maderia; Afghanistan? Kashmir? China? We have seen females from Afghanistan and Chusan, which we could not distinguish from the common European Blackbird; and are assured of its being common in the mountains surrounding Kashmir, at from 10,000 to 13,000 feet elevation. The Prince of Canino has recently distinguished a nearly affined "*Merula dactyloptera*" from Syria.

(277) *Turdus or Merula similima*. Of the mountainous parts of S. India and M. Kinnisii of those of Ceylon, though nearly affined, are sufficiently well distinguished from the Blackbird of Europe. In the Himalaya generally, the latter is replaced by *M. bouboul* (*pæcilopectera* of Vigors), which is not unfrequently brought in cages to Calcutta, where known as the 'Kastura.'

(278) *Cyanecula wolff*. (*Phænicura suecica*; 'Blue-throated Warbler.') Europe, W. Asia, Japan (Temminck), N. Africa; rare in Britain: migratory: abundantly replaced in India by *C. suecica*, and in middle Asia, Afghanistan, &c., by *S. cærulecula* (*cyane* of Eversmann); the first known by its pure white pectoral spot, which spot is always deep ferruginous in the Indian bird, and is wanting in that from middle Asia.

(279) *Ruticilla phænicurus*. (*Phænicura ruticilla*; 'Redstart.') Europe, W. Asia, Siberia (Schlegel), Japan, (Temminck,) N. Africa: migratory. Replaced in Sindh and Afghanistan by *R. phænicuroides*, which is probably the *phænicurus* noted from Nepal. There are numerous Himalayan species; and one, *R. rufiventris*, is generally diffused over India.

(280) *Pratincola rubicola*. (*Saxicola rubicola*; 'Stone-chat.') Europe, N. Africa, Japan (Temminck.) In India replaced by the nearly affined *Pr. indica*, and in Sindh also by *Pr. leucura*, as in S. Africa by *Pr. pastor*.

(281) *Pratincola rubetra*. (*Saxicola rubetra*; 'Whinchat.') Europe, N. Africa, Arabia (Schlegel): migratory. Erroneously assigned to India.

(282) *Saxicola ænanthe*. ('Wheatear.') Europe, W. Asia, plains of Upper India, N. Africa, Arctic regions, Greenland! Migratory.

There are several other Indian Wheatears, all of which are different from those of Europe excepting *S. leucomela*; but *S. stapaizina* is re-



placed in India by *S. atrogularis*, and *S. leucura* by *S. leucuroides* (*opistholeuca* of Strickland) which occurs likewise in N. E. Africa.

(283) *Locustella rayi*. (*Salicaria locustella*; 'Grasshopper Warbler.') Europe, Asia, N. Africa: migratory. Has once been obtained in Central India, and once in Lower Bengal; where an affined species, *L. Rubescens*, is not uncommon. Both specimens are in the Calcutta museum.

(284) *Acrocephalus arundinaceus*. (*Salicaria turdoides*; 'Thrushlike Warbler.') Europe, N. Africa, Arabia (Schlegel), Japan (Temminck); rare in Britain: migratory. Replaced in India by *Acr. brunescens*.

(285) *Sylvia atricapilla*. (*Currucula atricapilla*; 'Blackcap Warbler.') Europe, W. Asia, Arabia (Schlegel), Japan (Temminck), all Africa. One killed in Java (Temminck.)

(286) *Sylvia cinerea*. (*Currucula cinerea*; 'Common White-throat.') Europe, Asia Minor, Arabia (Schlegel), N. Africa: migratory.

(287) *Sylvia curruca*. (*Currucula sylvicola*; 'Lesser White-throat.') Europe, Asia, Africa: migratory. Common in India; and a nearly affined but larger species in S. India, *S. affinis* (*Currucula cinerea* apud Jerdon)

(288) *Sylvia orphea*. (*Currucula orphea*; 'Orpheus Warbler.') Europe, N. Africa, Arabia, (Schlegel) rare in Britain: migratory. The Indian race seems to differ only in having a somewhat longer bill: inhabiting both Upper Hindustan and S. India.

(289) *Phylloscopus trochilus*. (*Sylvia trochilus*; 'Willow Warbler.') Europe, Asia Minor, N. Africa; W. India (apud Gould, but needs confirmation): migratory. Has been known to stray to N. America.

(290) *Regulus cristatus*. ('Golden-crested Regulus.') Europe, N. Asia, Japan, W. Asia, Barbary: partially migratory. Replaced in the W. Himalaya by *R. himalayensis*.

(291) *Reguloides proregulus*. (*Regulus modestus*; 'Dalmatian Regulus.') Asia; very rare in Europe: one specimen obtained in Dalmatia and another in England. Common in India with several affined species.

(292) *Parus major*. ('Great Tit.') Europe, N. Asia, Japan, N. Africa. Replaced in India, Ceylon, and Java, by *P. cinereus*, and in the Himalaya also by *P. monticolus*.

(293) *Parus cæruleus*. ('Blue Tit.') Europe, N. Asia, Japan, China Formosa.

(294) *Parus ater*. ('Cole Tit.') Europe, Siberia, Japan, Formosa. Replaced in Nepal by *P. cæmodius*.

(295) *Orites caudatus*. (*Parus caudatus*; 'Long-tailed Tit.') Europe, N. Asia, Japan.

(296) *Calobates sulphurea*. (*Motacilla boarula*; 'Grey Wagtail.') Europe, Asia, Africa, Malay countries, Australia? Migratory within the British islands: common in India.

(297) *Pipastes trivialis*. (*Anthus arboreus*; 'Tree Pipit.') Europe, N. Asia, Japan, W. Asia, N. Africa; Himalaya (but much confounded with the common *P. agilis* of India): migratory.

(298) *Anthus pratensis*. ('Meadow Pipit.') Europe, N. Asia, Japan, Asia Minor, W. India, (Gould), Nepal (Hodgson, Gray); one specimen received from Pegu.

(299) *Anthus obscurus*. (*A. petrosus*; 'Rock Pipit.') Europe, Siberia, Japan. Replaced in the Himalayan region by *A. Cervinus*, which is likewise found in Europe.

(300) *Corydalla Richardi*. (*Anthus Ricardi*; 'Richard's Pipit.') Europe, Asia, N. Africa; common in India; very rare in Britain.

(301) *Corydalla campestris*. A common European bird which even abounds in the southern parts of Sweden, but has not hitherto been observed in Britain, is also common in parts of India.

(302) *Galerida cristata*. (*Alauda cristata*; 'Crested Lark') Europe, Asia, N. Africa; rare in Britain; common in India, where known as the *Chandul*.

(303) *Calendrella brachydactyla*. (*Alauda brachydactyla*; 'Short-toed Lark.') S. Europe, N. Africa; rare in Britain; extremely common in India, where currently known to Europeans as the 'Ortolan.'

(304) *Certhilanda desertorum* of Spain and N. Africa inhabits Sindh; and the *Ammomanes Lusitonia* occurs in the deserts of N. W. India, being replaced further south by *A. phœnicura*.

(305) *Emberiza miliaria*. ('Common Bunting.') Europe, W. Asia, Arabia (Schlegel), Barbary.

(306) *Emberiza citrinella*. ('Yellow Bunting.') Europe, to beyond the polar circle: replaced in the W. Himalaya by *E. pithyornis*, an inhabitant also of Siberia, which occurs rarely in W. Europe.

(307) *Emberiza Cía* of S. Europe is common in the W. Himalaya; and *E. Pusilla*, which seems to be plentiful in Sikhim, has occasionally been observed in Europe, even so far west as Leyden. *E. fucata* of N. Asia, Japan, and common in the W. Himalaya, occurs sometimes in considerable numbers in Lower Bengal. *E. melanoccephala* of S. Europe is common in parts of India.

(308) *Fringilla montifringilla*. ('Mountain Finch.') Europe, N. Asia, Japan, Asia Minor, Afghanistan, Kashmir, W. Himalaya; a winter visitant in Britain. The European *Montifringilla Nivalis* has been obtained at Kandahar.

(309) *Passer montanus*. ('Tree Sparrow.') Europe, Asia (commoner to the eastward) Siberia, Tibet, Sikhim, Arakan, Malayan peninsula, Java, China, Japan.

(310) *Passer domesticus*. ('House Sparrow.') Europe, Asia, N. Africa; the Indian race (*P. indicus* of Jardine and Selby) differing slightly

from the European in the paleness of the females and young, the much more albescent hue of the lower-parts, and bright rufous colouring on the back of the adult male.

(311) *Passer salicarius*. (*vel hispaniolensis*) of Barbary and the southern parts of Europe, Asia Minor, Bokhara, and Afghanistan, visits the Peshawur valley and Kohat in large flocks, being everywhere more highly gregarious than *P. domesticus*. *P. Petronia* (*V. Petronia Stulta*), also of S. Europe and N. Africa to Madeira; is common in Afghanistan.

(312) *Coccothraustes vulgaris*. ('Hawfinch.') Europe, Siberia, China, Japan (*qu. C. Japonicus*, Schlegel?)

(313) *Chrysomitris spinus*. (*Carduelis spinus*; 'Siskin.') Europe, Siberia, Japan: a winter visitant chiefly in Britain, breeding in the far north.

(314) *Linota cannabina*. ('Common Linnet.') Europe, Siberia, Japan, Asia Minor, Barbary.

(315) *Linota canescens*. ('Mealy Redpole.') Northern regions chiefly, Greenland, Japan: an irregular winter visitant in Britain.

(316) *Linota montium*. ('Mountain Linnet.') Europe, N. Asia, Japan: N. or S. Britain according to season: replaced in Afghanistan by *L. Brevirostris*.

(317) *Carpodacus erythrinus*, which is rare in the N. E. of Europe, is a common winter visitant over the greater part of India.

(318) *Loxia curvirostra*. ('Common Crossbill.') Circuit of northern regions: all Europe; Afghanistan: an irregular visitant in Britain: in America it has been obtained so far south as in the Bermudas. A much smaller species inhabits the Himalaya, the *L. Himalayana*.

(319) *Loxia bifasciata*. ('European White-winged Crossbill.') N. Europe and Asia. Himalaya (Gould): rare in Britain.

(320) *Sturnus vulgaris*. ('Common Starling.') Europe, Asia, Africa, Azores: common in the Himalaya and N. India, Kashmir, Afghanistan, &c., as in Britain. N. B.—An Afghan specimen, assigned to *St. Unicolor*, appertains to the present species, being an old male with the pale specks obsolete: the true *St. Unicolor* of Sardinia, Barbary, &c., is very distinct and much less bright in its glosses.

(321) *Pastor roseus*. ('Rose-coloured Pastor.') Europe, Asia, and Africa: common in India; rare in Britain.

(322) *Fregilus graculus*. ('Chough.') High mountains and sea-cliffs of Europe, Asia, and Africa: common in high Central Asia, the Himalayas, Afghanistan, &c.; as is also the *Pyrrhocorax alpinus* of the Swiss Alps and Pyrenees.

(323) *Corvus corax*. ('Raven.') Circuit of northern regions; rare in N. Africa, Punjab, Kashmir, Afghanistan; the Tibetan species con-

sidered distinct, but probably on insufficient evidence.

(324) *Corvus corone*. ('Carion Crow.') Europe, Afghanistan, (Pushut), Japan (*apud Temminck*).—Replaced in India by *C. Culminatus*.

(325) *Corvus cornix*. ('Hooded Crow.') Europe, Asia Minor, Afghanistan, Japan (Temminck), Barbary. Considered by some to be identical in species with No. 131.

(326) *Corvus frugilegus*. ('Rook.') Europe, N. and W. Asia, Afghanistan, Peshawur valley, Kashmir: replaced in China and Japan by *C. Pasinator*.

(327) *Corvus monedula*. ('Jackdaw.') Europe, Siberia, Barbary, W. Asia, Peshawur valley, Kashmir.

(328) *Pica caudata*. ('Magpie.') Europe, W. Asia, Siberia, E. N. America, China? Japan? Replaced in Afghanistan and W. Tibet by *P. bactriana*, in E. Tibet by *P. bottanensis*, in China and Japan (?) by *P. media* and Barbary by *P. mauritanica*.

(329) *Funx torquilla*. ('Wryneck') Europe, Asia, N. Africa, China, Japan, Kamischatka; common in India, as in Britain: migratory.

(330) *Upupa epops*. ('Hoopoe.') Europe, Asia, Africa; a common winter-visitant in Lower Bengal, but generally replaced by a nearly allied race in Upper Hindustan and S. India.

(331) *Sitta syriaca*, or 'Rock Nuthatch' of S. E. Europe, and Asia Minor, or a species of similar habits (most probably the same), inhabits Afghanistan:

(332) *Tichodromus muraria*, or Wall Creeper of S. Europe, is very common in the Himalaya, Afghanistan, &c.

(333) *Cuculus canorus*. ('Common Cuckoo.') Europe, Asia, Africa, Malay countries: common in the Himalaya, visiting the plains during the cold season.

(334) *Coracias garrula*. ('Roller.') Europe, Africa, W. Asia, Afghanistan, Kashmir, Sindh, Punjab? migratory in Europe; and rare in Britain.

(335) *Merops apiaster*. ('Bee-eater.') Europe, Africa, W. Asia, Afghanistan, Kashmir, Sindh, Punjab? migratory in Europe, and rare in Britain.

(336) *Hirundo rustica*. ('Swallow.') Europe, Asia, Africa; migratory: common in the plains of India during the cold season.

(337) *Hirundo urbica*. ('Martin.') Europe, Africa, Asia, (Siberia;) somewhat rare (or local?) in India: migratory.

(338) *Hirundo riparia*. ('Sand Martin.') Europe, Asia, Africa, N. America; migratory: in India local, and mostly replaced by *H. sinensis*.

(339) *Hirundo rupestris* of S. Europe is common in the high mountains of India; and there is a diminutive of it also in the *H. concolor* of Sykes.

(340) *Cypselus Apus*. ('Common Swift.')



# BIRDS OF SOUTHERN ASIA.

Europe, N. Africa, W. Asia, Afghanistan; migratory.

(341) *Cypselus melba* (*C. alpinus*; 'Alpine Swift.') High mountains (chiefly) of Europe, Asia, and Africa: tolerably common in the Himalaya, Central India, Nilgiris, and Ceylon: rare in Britain.

(342) *Acanthylis caudacuta*, or large Spiny-tailed Swift of the Himalaya, has once been shot in England, according to Mr. Gould.

(343) *Caprimulgus Europæus*. ('Night-jar,') Europe, N. Africa, W. Asia; Siberia and Kamtschatka (Pennant:) migratory. Several species inhabit India.

(344) *Columba livia*. ('Rock Dove.') Europe, N. Asia to Japan, N. Africa: abundantly replaced in India by the barely separable *C. intermedia*.

(345) *Sterna cinerea* (*Perdix cinerea*; 'Common Partridge.') Europe, S. Siberia, Asia Minor: Mesopotamia? Persia? Egypt? a near congener lately discovered in Tibet.

(346) *Coturnix vulgaris*. ('Common Quail.') Europe, Asia, Africa: chiefly migratory. Abundant in India, though M. Gould considers the race of this country to be distinct.

(347) *Tetrao campestris*. (*Otis tetrao*; 'little Bustard.') Europe, N. Africa, Asia Minor, Mesopotamia, extreme N. W. of India (Peshawar valley.)

(348) *Houbara Macqueenii*. (*Otis Macqueenii*; 'Maqueen's Bustard.') N. W. of India, Afghanistan, &c. Very rare in Europe.

(349) *Edicnemus crepitans*. ('Great Plover.') Europe, Asia, Africa: common in India.

(350) *Charadrius hiaticula*. ('Ringed Plover,') Europe, N. Asia, Japan, Greenland.

(351) *Charadrius cantianus*. ('Kentish Plover.') Europe, Asia: not uncommon in India.

(352) *Charadrius philippinus* (*Ch. minor*; 'Little Ringed Plover.') Europe, Asia, N. America: rare in Britain; exceedingly common in India. *Charadrius pyrrhothorax*, a very common Indian species, is known in Europe as a straggler.

(353) *Calidris arenaria* ('Sanderling.') Circuit of northern regions, N. and S. Africa, N. Guinea: rare in India (so far as observed hitherto; but probably not so along the sea-coast.

(354) *Squatarola helvetica* (*Sq. cinerea*; 'Grey Plover.') Circuit of northern regions, Japan, Java, N. Guinea, Australia: tolerably common in India.

(355) *Vanellus cristatus*. ('Lapwing.') Europe N. and middle Asia, N. Africa: common in N. India, Sindh, &c., but not seen in Lower Bengal.

(356) *Streptopus interpres* ('Turnstone.') Inhabits all sea-coasts, from the equator to the poles: common along those of India.

(357) *Hæmatopus ostralegus*. ('Oystercatcher.') Circuit of northern regions, to the equator, if not further south: not rare along the shores of the Bay of Bengal, &c.

(358) *Grus cinerea* ('Common Crane.') Europe, Asia, N. Africa: migratory; now rare in Britain: common in India during the cold season.

(359) *Ardea cinerea*. ('Common Heron.') Europe, Asia, N. and S. Africa: common in India.

(360) *Ardea purpurea*. ('Common Heron.') Europe, Asia, Africa: common in India.

(361) *Herodias alba*: *Ardea alba*; 'Great White Heron,') Europe, Asia, N. Africa: very rare in Britain: very common in India, though the race is considered different by some.

(362) *Herodias garzetta* (*Ardea garzetta*; 'Little Egret.') Europe, Asia, N. Africa: exceedingly rare in Britain: very common in India.

(363) *Herodias bubulcus* (*Ardea russata*; 'Buff-backed Heron.') Europe, Asia, N. Africa. exceedingly rare in Britain: very common in India.

(364) *Ardetta minuta*. (*Botaurus minutus*; 'Little Bittern.') Europe, all Africa, W. Asia, Himalaya, Kashmir; replaced in Lower Bengal by *A. sinensis*, and more abundantly by *A. cinamomea*, which is common throughout India.

(365) *Botaurus stellaris*. ('Common Bittern.') Europe, Asia, all Africa: common in India.

(366) *Nycticorax Gardeni*. ('Night Heron.') Europe, Asia; Africa, N. America (? Species at least barely separable): very common in India.

(367) *Ciconia alba*. ('White Stork.') Europe, Asia, N. Africa, migratory: common in India during the cold season in immense flocks in Lower Bengal.

(368) *Ciconia nigra*. ('Black Stork.') Europe, Asia, N. Africa: not uncommon in India.

(369) *Platalea leucorodia*. ('White Spoon-bill.') Europe, Asia, all Africa: common in India.

(370) *Fulcinellus igneus*. ('Ibis fulcinellus; 'Glossy Ibis.') Europe, Asia, Africa, N. and S. America, Australia: very common in India.

(371) *Numenius arquata*. ('Common Curlew.') Europe, N. Africa, Asia (to Japan), Malasia: very common in India.

(372) *Numenius phæopus*. ('Whimbrel.') Europe, Asia, N. Africa: common in India, along sea-coast and estuaries.

(373) *Totanus fuscus*. ('Spotted Red-shank.') Europe, Asia: common in India.

(374) *Totanus calidris*. ('Common Red-shank.') Europe, Asia: very common in India.

(375) *Actitis ochropus*, (*Totanus ochropus*; 'Green Sandpiper.') Europe, Asia, N. Africa: very common in India.

(376) *Actitis glareola*. (*Totanus glareola*; 'Wood Sandpiper.') Europe, Asia, Africa, from Lapland to the Cape of G. Hope: Java, &c.: exceedingly common in India.

(377) *Actitis hypoleucos*. (*Totanus hypoleucos*; 'Common Sandpiper.') Europe, Asia: exceedingly common in India.

(378) *Totanus glottis*. ('Green-shank.') Europe, Asia: common in India.

## BIRDS OF SOUTHERN ASIA.

Europe, Asia, Africa, Australia; stragglers obtained in N. America: very common in India.

(379) *Recurvirostra avocetta*. ('Avocet.') Europe, Asia, all Africa: not rare in India.

(380) *Himantopus candidus*. (*H. melanopterus*; 'Black-winged Stilt.') Europe, Asia, all Africa: common in India.

(381) *Limosa algocephala*. (*L. melanura*; 'Black-tailed Godwit.') Europe, Asia, N. Africa, Australia: very common in India.

(382) *Limosa rufa*. ('Bar-tailed Godwit.') Europe, N. Africa, W. Asia: Nepal (Hodgson, Grey), Java and Timor (Temminck).

(383) *Philomachus pugnax*. (*Machetes pugnax*; 'Ruff.') Europe, Asia, N. Africa: common in India.

(384) *Scolopax rusticola*. ('Woodcock.') Europe, Asia, N. Africa: very common in Himalaya, not rare in the Nilgiris, more so in the highlands of Ceylon; a specimen occasionally shot in Lower Bengal.

(385) *Gallinago scolopaciinus*. (*Scolopax gallinago*; 'Common Snipe.') Europe, Asia, N. Africa: very common in India.

(386) *Gallinago gallinula*; (*Scolopax gallinula*; 'Jack Snipe.') Europe, Asia, Barbary: common in India.

(387) *Tringa subarquata*. ('Curlew Sandpiper.') Circuit of northern regions, to beyond the equator; Australia; Very common in India.

(388) *Tringa canutus*. ('Knot.') Circuit of northern regions: rare in India.

(389) *Tringa platyrhynchos*. ('Broad-billed Sandpiper.') Europe, Asia; Sumatra, Borneo, Timor (Temminck); not uncommon in India: rare in the U. S. of America.

(390) *Tringa minuta*. ('Little Stint.') Europe, Asia: very common in India.

(391) *Tringa Temminckii*. ('Temminck's Stint.') Europe, Asia, N. Africa: common in India.

(392) *Tringa alpina*. (*Tringa variabilis*; 'Dunlin.') Arctic regions; circuit of northern regions; Japan; Timor (Temminck); Guiana: not rare in India.

(393) *Phalaropus fulicarius*. ('Grey Phalarope.') Circuit of northern regions: one specimen obtained near Calcutta.

(394) *Lobipes hyperboreus*. (*Phalaropus hyperboreus*; Red-necked Phalarope.) Circuit of northern regions: one specimen obtained near Madras, another in Nicaragua, and a pair in the Bermudas.

(395) *Crex pratensis*. ('Landrail.') Europe, Asia, N. Africa: common in Afghanistan, rare in the N. W. of India: specimen obtained in the Bermudas.

(396) *Porzana Marnetta* *Crex porzana*; 'Spotted Crake.') Europe, Asia, N. Africa: common in India.

(397) *Porzana pusilla* (*Crex pusilla*; 'Little

Crake.') Europe, N. Africa, W. Asia, Japan: Nepal (Hodgson.)

(398) *Porzana Baillonii* (*Crex Baillonii*; 'Baillon's Crake.') Europe, Asia to Japan, all Africa: exceedingly common in India.

(399) *Gallinula chloropus*. ('Moorhen.') Europe, Asia, all Africa: common in India.

(400) *Fulica atra* ('Common Coot.') Europe, Asia, N. Africa, where found additional to *F. cristata*: America and Javanese species distinct: common in India.

(401) *Anser cinereus* (*Anser fesus*; 'Grey-leg Goose.') Europe, and Asia: common in India.

(402) *Anser brachyrhynchus*. ('Pink-footed Goose.') Europe, N. Asia: Punjab (rare)?

(403) *Bernicla ruficollis*. (*Anser ruficollis*; 'Red-breasted Goose.') N. Asia, chiefly: rare in N. India.

(404) *Cygnus musicus*. (*Cygnus fesus*; 'Hooper Swan.') N. Europe and Asia; N. Africa; migratory: one specimen obtained in the valley of Nepal.

(405) *Casarca rutila*. (*Tadorna rutila*; 'Ruddy Sheldrake.') Europe and Asia, N. Africa (replaced in S. Africa by *C. Cana*): very common in India.

(406) *Tadorna vulpanser*. ('Common Sheldrake.') Europe, Asia, N. Africa: common in the Punjab; not rare in Lower Bengal.

(407) *Spatula clypeata*. (*Anas clypeata*; 'Shoveller.') Circuit of northern regions, N. Africa: tolerably common in India.

(408) *Anas strepera*. ('Gadwall.') Circuit of northern regions; Barbary: tolerably common in India.

(409) *Anas acuta*. ('Pintail Duck.') Circuit of northern regions, Barbary: very common in India.

(410) *Anas boschas*. ('Wild Duck.') Circuit of northern regions, Barbary: in India confined to Sindh, Punjab, and the Himalaya and its vicinity; replaced Southward by *A. Pæcilorhynchos*.

(411) *Anas querquedula*. ('Garganey.') Europe, Asia, N. Africa: very common in India.

(412) *Anas crecca*. ('Teal.') Europe, Asia, Barbary: common in India.

(413) *Anas penelope*. ('Widgeon.') Europe, Asia, N. Africa: common in India.

(414) *Fuligula ferina*. ('Pochard.') Circuit of northern regions, Barbary: common in India.

(415) *Fuligula nyroca*. ('Ferruginous Duck.') Europe, Asia, N. Africa: common in India.

(416) *Fuligula marila*. ('Scaup Duck.') Circuit of northern regions: Punjab, Sindh, Nepal.

(417) *Fuligula cristata*. ('Tufted Duck.') Europe, Asia, Barbary: common in India.

(418) *Clangula Glaucion*. (*Fuligula clangula*; 'Goldemeye.') Circuit of northern regions N. Africa: Sindh, Punjab.



## BIRDS NESTS ROCKS OF KARANG BOLLONG.

(419) *Mergellus albellus*. (*Mergus albellus*; 'Sineu') Circuit of northern regions; W. Asia, Sindh, Punjab, Oudh; apparently not rare along the Punjab rivers.

(420) *Mergus merganser*. ('Goosander.') Circuit of northern regions: not rare in the Himalaya; rare in Central India (*M. orientalis* of Gould.)

(421) *Podiceps cristatus*. ('Great-crested Grebe.') Europe, Asia, all Africa, America; the Australian barely separable: Himalaya, Bengal Sunderbans. Perhaps commoner than generally supposed in India, from its secluded habits and the great difficulty of procuring specimens.

(422) *Podiceps philippensis*. (*P. minor*; 'Little Grebe.') Europe, Asia and its islands, N. Africa: very common in India.

(423) *Phalacrocorax carbo*. ('Common Cormorant.') Circuit of northern regions, Barbary: common in the Himalaya; rare in Central India.

(424) *Sylochelidon caspia*. (*Sterna caspia*; 'Caspian Tern.') Warmer regions of the old World generally, Australia (*S. strenuus*, Gould): not rare in parts of India; but doubtful as occurring in Lower Bengal.

(425) *Sterna paradisea*. (*Sterna Dougalli*; 'Roseate Tern.') Europe, Asia, Africa, America, Australia: coasts of India.

(426) *Sterna hirundo*. ('Common Tern.') Europe, Asia, Africa: S. India, Ceylon.

(427) *Hydrochelidon indica*. (*Sterna leucoparica*; 'Whiskered Tern.') Europe, Asia, Africa, Malay countries; very common in India.

(428) *Gelochelidon anglica*. (*Sterna angelica*; 'Gull-billed Tern.') Warmer regions of the old World, extending also to America; Java: common in India.

(429) *Sternula minuta*. (*Sterna minuta*; 'Lesser Tern.') Northern hemisphere; replaced in S. America and Australia by nearly allied species: common on the west-coast, and in parts of S. India.

(430) *Anous stolidus*. (*Sterna stolidus*; 'Noddy Tern.') Of general distribution, over the warmer parts of the ocean: common in the Indian seas.

(431) *Onychoprion fuliginosus*. (*Sterna fuliginosa*; 'Sooty Tern.') Very generally distributed, like the last; Bay of Bengal.

(432) *Xema ridibunda*. (*Larus ridibundus*; 'Black-headed Gull.') Europe, Asia, N. Africa: not rare in India, but less common than the nearly allied *X. brunneocephalus*.

(433) *Larus fuscus*. ('Lesser Black-backed Gull.') Atlantic, Mediterranean, Red Sea, Indian Ocean, Cape of G. Hope, N. Zealand, Kabul (Burnes), Bay of Bengal.

(434) *Procellaria hæsitata*. ('Capped Petrel.') Indian and southern oceans: a rare straggler in Britain, that has been obtained once only.

(435) *Puffinus obscurus*. ('Dusky Petrel,')

Tropical and S. Seas; Australia; rare northward.—*Cal. : Rev. : No. IV. March, 1857.*

## (436) BIRDS NESTS ROCKS OF KARANG BOLLONG.

The district of Karang Bollong is situated in the residency of Bagelen, division Ambal, on the southerly sea coast between the rivers Chinching-golong and Djétis, both of which have their embouchure in the sea.

Generally speaking the place may be considered healthful. The thermometer (Fahrenheit) is found, as a mean, in the morning at 6 o'clock from 70° to 74°, at noon from 82° to 85° and in the evening at 6 o'clock from 77° to 79°.

The population of the district Karang Bollong consists of 4000 able bodied men, who find their livelihood by gathering birds nests, in the cultivation of sawa and in fishing. The women on their part keep themselves busy in weaving cloths, which are everywhere in good demand, and are much sought for in the capitals on the residencies Surakarta and Djekjarta. Karang Bollong furnishes annually an important produce of birds nests, but it is less known in what manner the collection is made and with how much danger to life it is attended. For this reason we have deemed it not inappropriate to give a description of it here as exact as possible, commencing from the time when the collections begin.

The gathering of the birds nests takes place three times a year under the name of Uduan kesongo, tellor and kapal. The first begins in the end of April, the second in the middle of August, and the third, in December. The yearly produce is commonly between 50 and 60 piculs.

When the time for the gathering approaches the heads come together with the persons they employ before the residence of the overseer, who then, in the presence of the Wodons, Mantre and the writer, fixes the amount destined for the procuring of buffaloes, he-goats, rattans, and torches, as well as the distribution of opium, incense and atat.

After all this has been done, a servant is sent to the Goa Nogosarie accompanied by the head men of this cliff. The Goa Nogosarie is the most accessible, provided the sea is not too rough. Six nests are then ordinarily collected to be compared with the sample of the previous year and to judge if the collection can take place or not.

If the head men consider that the nests are fit to be collected, the people then send for the Wayang and Toppeng, and the overseer makes further regulations with the head men of the cliff, for what is necessary for offerings and feasts.

According to old custom, a thursday is always chosen to make a beginning with the preparation of what is needed for the feast, so that on this day the people occupy themselves with cleaning

## BIRDS NESTS ROCKS OF KARANG BOLLONG.

the ballang, the cliff which is situated at the mouth of the river Tjintjing Guling.

The next morning (friday) the buffaloes are killed. Two hours afterwards they take some pieces of flesh, tongue, entrails, &c., from the slaughtered animals, and place them on small bowls woven of bambus called sadjen. They are then offered to Bollong Watu Tumpang and near the watch houses of the cliffs at Dabar, Gedee, Wale, and Nogosarie; while at the cliff of Medjengklek a he-goat is offered with incense. This festival must, by old custom, always take place on a friday, which by the natives is called Ngaderan. In the afternoon of the same day a Wayang is performed in the Bollong, generally a piece of seven acts: while the necessary flowers, fruits, ointments, sir, pinang &c., and what is further required for the offerings, are prepared by the Tukan Kembang. All these materials are placed on the before mentioned bambu bowls, and in the evening at  $\frac{1}{2}$  past 5 o'clock, are brought by a servant into the Bollong near the Seroot tree. The origin of this tree is ascribed to a Javanese named Kiai who is buried there and above whose grave the tree has risen; and now the superstition of the natives declares that the tree has sprung from the navel of the dead. They likewise make offering on the burial place, at the waringin tree, and in the room, the pantry, kitchen and other places in the dwelling of the overseer.

After the wayang-players have returned from the Bollong, the bed placed near the entrance of the godown, known under the general appellation of devils-bed or bed of Nyai Ratu Kidul (which has existed from time immemorial) is put in order by the Tukan Gedong and ornamented with some silk and other cloths. Nobody but this woman is allowed to do this. Every thursday during the time of the collection this bed is cleaned and offerings are made to it.

After everything has been made ready the small lamps are lighted and the small bambu bowls with flowers, fruit, &c. are placed with particular marks of honor by the Tukan Gedong before the bed on a small couch made for the purpose. At the same time she says in high Javanese, as if addressing some distinguished person "By order of Mijneer (meaning the overseer) I here bring wherewithal for you alone to eat." After this speech the Tukan Gedong, herself answers "Yes, mother, Tukan Gedong, say to father Mijneer (the officer) that I returned my thanks for the food which he has sent me."

After this ceremony is finished the Tukan Gedong remains sitting on the bed, and further asks Nyai Ratu Kidul (who is supposed to be present in the bed) "if it be agreeable to her that the birds nests should be collected, and if it shall take place without mischance," which request is ordinarily answered with "yes" (ingee.)

During this time the wayang is kept up till the next morning.

The following morning (saturday) the heads of the cliffs Dabar and Gediego, with the persons whom they have employed, in their gangs, with the ladders which have been prepared some days before, and accompanied by the Gedeks and Sentonos for each cliff, in order to make further preparations for a commencement; while during all the day the toppeng play is maintained.

The cliffs Walo and Nogosarie are visited eight days later, and Medjengklek two days after that. He enquired what could be the reason for visiting these cliffs latest but no explanation could be given to him. In the evening the toppeng-play being finished, the so called Karang Bollong feast begins, on which occasion the gamilang and two or three dancing girls make themselves heard. At the first seven acts the dancing girls turn their heads towards the birds nest warehouse in honor of Nyai Ratu Kidul, and it is a general custom in the district of Karang Bollong wherever a feast is given to dedicate the first seven songs to the honor of Nyai Ratu Kidul. So soon as the wedons, mantre, writer, the head of the cliffs with their people, and some heads of the dessas, are met, they sit down on a mat in a circle to dine. The writer places himself at the head of this table and proposes different toasts to the success of the approaching collection. After the guests have satisfied themselves, opium is offered to every person present. The company enjoy themselves some with dancing to the music of the Gamelang, some with opium smoking, while others occupy themselves with chewing serree, and this continues till midnight, when the feast ends.

After the feast (on sunday morning) the head men take their departure for their rocks, and, if the sea is not too rough, the ladders are joined in order to reach the entrance of the holes that they may collect six birds nests, which, from produce, are again compared with the musters. The harvest is then arranged. But if it should be found that the nests are not yet ready to be gathered, further preparations are stopped in order that the swallows may not be disturbed. If it is found that the nests are of the proper bulk, the work is continued by making stages and ladders and fastening them to the rocks into which the collectors have to descend. All these operations being completed in five or six days, the inhabitants of the nearest dessa go to the cliffs Dabar and Gedee with the men belonging to these cliffs, accompanied by gandeks and sentonas who carry with them the requisite bags to contain the nests which may be gathered.

The number of collectors for the first day is limited to 80 or 90 persons for each of the two cliffs, and this number afterwards diminishes as the nests are gathered. When the bags are



## BIRDS NESTS ROCKS OF KARANG BOLLONG.

filled they are brought to the godown under the direction of Guru. On arriving there, a sedeka is given, consisting of red and white huber, and this feast is regulated by the collectors of the day for each cliff. After the priest has spoken his benediction over it and the dishes have been eaten, the nests are weighed and stored in the godown on a flooring of plank made for them.

The work of the remaining cliffs Wollo Medjiengklek and Nagosarie is nearly the same, but the collection at the first two places is made by the people employed without any payment on account of the smallness of the produce. With respect to the last, sixty or seventy persons are ordinarily employed, and 57 to 60 rupees copper is paid for each collection to the head men. The sum is divided amongst the bekels and the people. On account of these cliffs being situated at about five miles distance over very difficult roads, the birds nests are kept and watched till the next morning in a bamboo house, called Kongsie, made near the watch house of the cliff. They are afterwards brought to the godowns for which each bearer receives 5 cents, a sogo of opium of  $\frac{1}{4}$  sikar weight. A Sikar being a half cent or the 2 hundredth part of a rupee or gulden (guilder.)

The collection of the nests necessarily depends altogether on the state of the sea. On the top of the mountain Kuda a flagstaff has been erected for this reason, and when a white flag is hoisted it is a signal that the sea is calm, and that the caves can be approached, but if a black flag be shewn it is a signal that the sea is too rough. Each collection from all the caves is finished in twenty-four days. The principal birds nest cliffs are those described above, and they extend from the east to the west along the Karang Bollong south cape. Between these there are some smaller cliffs, the produce of which is of little or no importance.

The collection of the nests is attended with much difficulty and sometimes even with danger to life, because the apertures are situated at the foot of the rocks and are consequently on a level with the surface of the sea, so that the water washes in and out of some of the caves. Hence when the sea is somewhat rough it is impossible to reach the apertures, much less to enter them. In order to form a just idea of the dangerous work which must be performed by the collectors the following is an exact description of it.

To enter the caves you descend one precipice of two hundred feet, nearly perpendicular, by means of one, two or three rattan ladders (according to the greater or less height) which are 5 inches broad and each 77 feet long. The lateral or principal ropes are composed of wild rattans twisted together to a thickness of two inches, and having wooden steps two inches thick and thirteen inches distant from each other. The upper end of the ladder is well fastened to

a strong tree by black ropes and the lower end is placed on one of the rocks.

In order to reach one of the caves, they make use of two rattans each one hundred and eight feet long; but in some cliffs, bambus are used 12 to 18 feet long which are placed one above the other—that they may steady themselves by holding the upper when walking along the under. The entrance of the caves is about 43 feet broad, more or less, and 30 high. The interior is from 60 to 114 feet broad and from 420 to 480 high. The bottom of most of the caves is washed for about one quarter of its length by the sea three, four or more feet in depth. The whole of the interior appears to consist of limestone. In the caves are stages, made of bambus which are bound fast with ropes to the walls of the rocks on which the collectors stand. It often happens, in consequence, that the cliffs on which the ropes of the stage are fastened become loosened and the whole stage is precipitated, which sometimes occasions a loss of life. Most of the nests are taken from the wall by the hand, and these which are on the roof, by an iron hook fastened to a long bambu.

The swallow named lawet, has a compressed head, which, however, with its thick and rounded feathers appears large in comparison with the body. The beak is broad and wide with a black awl-shaped small point bent downwards. The eyes are black and tolerably large, and the tongue arrow shaped. The throat is very short as well as the bones of the wings and feet. The feet consist of four toes of which three are in front and one behind. All the toes have black, curved, sharp, and tolerably long claws, so that the bird can every where lay fast hold of the rocks and cliffs. The tail is almost as long as the whole body. When the throat, the wings and the head are spread out, the bird has a circular appearance. The colour is greyish black inclining a little to green. On the back near the tail to the belly the blackish passes into mouse-colour. The breast is bluish.

Besides these, some other species called lintye inhabit some caves. These are somewhat smaller, and have a white breast. In other respects they agree completely with the lawet. The nests which they make are constructed of grass stalks. They are, however, of the same form, and are as artfully made as the others, but are without the least value. The residence of these swallows lintye in the caves, contributes greatly to the injury of the caves, for which reason they are destroyed as much as possible at each gathering.

On the walls of the rocks, the birds build their nests in horizontal layers close to each other. They place them at different heights from 50 to 300 feet, as they find room, and leave no holes or suitable space open, provided they are clean and dry; for when the walls prove damp they forsake their nests.

the sea attains a high level, which is usually accompanied by a strong surf beating against the cliffs, a percolation of water is caused which is in the highest degree prejudicial.

In the mornings at break of day the birds fly out with a great noise to seek their food, to the neighbouring places in the east monsoon or dry season, but in the west monsoon or rainy season, they do not go far. They return to their caves about 4 o'clock in the afternoon. They feed upon different kinds of insects, hovering above the stagnant waters, for which their wide open beak is very usual.

Their greatest enemies are the birds ulang and alap alap, who pull the young swallows out of the holes and seize many as they fly out of the caves.

They form the nests, by returning the strongest and best fragments of the food which they have eaten.

When the nests have been all plucked, the entrances are closed with bambu fences, the doors are sealed, and the rattan ladders are brought back to the store house.

The nests in the store house are, some days afterwards, weighed, and packed in hampers (geboks, each 25 caties), made very tight with cross ropes, and sealed with the stamp of the overseer. Pieces of paper are placed on each hamper, with the number and the nett weight of the nests written on it.

All this having been done, the hampers are surrounded with cocoanut leaves, prepared in the manner of kadjang mats. Every two hampers are then made fast to a piece of bambu (pikol an) provided with two props, in order that, when resting on the way, the hampers may not touch the ground. They are besides covered with pinang bark so that when it rains the water can run off. Finally they are all sent to Surakarta in order that they may be there sorted.

The evening before the birds nests are sent off another feast is given, and on the following morning, all the coolies depart with their hampers for Surakarta amidst the playing of the gamelang and shouts of hurrah.—*Journal of the Indian Archipelago*, N<sup>o</sup> III, September, 1847, page from 101 to 108

(437) BISMILLAH, means literally, in the name of God, and Mahomedans never commence eating without using it. It is often used by them also, in commencing a book or used in rising or sitting down.—*Herk.* Bismillah irruhman-*irruheen*. In the name of God the merciful, the compassionate, are words first taught to Mahomedan children, at the age of four years, four months and four days, with certain ceremonies.—*Herk.*

(438) BLAKANG MATI. A barren island, near Singapore, about 2½ miles long, and 308 feet in height.

tree, a native of mountainous parts of the Circars. The wood of this tree is white, close grained, and durable, the Natives employ it for a variety of purposes.—*Rohde M.S.S.*

#### (440) BLEACHING.

Nikharna or khumbi kar- | Nana padam, TEL.  
na, HIND. | Salavy<sup>n</sup> punnookiradoo.  
TAM.

In India there is but little occasion for the use of powerful chemical agents, the agency of light being sufficient. After the substances present in goods which oppose the bleaching process are removed by scouring in an alkaline ley, natives usually have recourse to dunging Cloths which are to be bleached and steaming them over the mouth of an earthen pot set in a clay fire place, but little science enters into the process and generally the goods suffer much from the water in which they are scoured being over charged with lime.

It will be remarked by all who have paid any attention to the matter and who have had opportunities, that bleached cloth, particularly in tents, is far less durable than that which has merely had the dressing and filth *thoroughly* removed by washing, this is easily explained as cotton goods have a certain resinous substance in them that obstructs the absorption of moisture. Besides the removal of this, cloth sustains much damage from the abuse of the caustic ley bath; it may be remarked that cloths should be scoured more than once at intervals during the process of bleaching, as many of the substances cannot be removed but after exposure to the light and air.

Wool also is protected by a peculiar varnish exceeding three per cent of its weight, which must be removed by scouring, *warm* hot boiling water must be employed, wool is further bleached by sulphuring either in close chambers in which sulphur is burnt, or by the sulphuric bath; in either case, it acquires a brittleness which must be removed by washing in soap and water.—*Rohde M.S.S.*

(441) BOA, or BOE, sometimes called Poam by the people of Malabar. This wood is much like the timber called in Ceylon Palari, or Palis, and Irambu, or, as known by the English name iron-wood. It is strong, heavy wood, and is considered durable. It grows from twenty to thirty feet high, and from twelve to thirty inches in diameter.—*Edye. M. and C.*

(442) BOATS, SHIPS &c. The native vessels of the coast will take to Bombay about two large and three small spars for a cargo, and a raft of three or four in two at the proper season of the year. Should the spars be required to be sent to Calcutta, or to England, a large mast-ship, with a raft-port at least three feet square, would be required; this would be expensive, and in India difficult to procure.—*Edye. M. and C.*

A description of the various Classes of Vessels constructed and employed by the Natives of the



Coasts of Coromandel, Malabar, and the Island of Ceylon, for their Coasting Navigation was first given by John Edye, Esq., late Master Shipwright of His Majesty's Naval Yard at Trincomalle, afterwards Department of the Surveyor of the Navy, and was communicated by the late Major-General Sir John Malcolm, G. C. B., K. L. S., M. R. A. S., &c., &c. to the *Journal of the Royal Asiatic Society*, and read 1st of June, 1833.

The following Paper having been referred by the Council of the Royal Asiatic Society to Sir John Malcolm, for his opinion as to its eligibility for insertion in the printed transactions of the Society, was returned by that distinguished and lamented individual, with a letter of which a copy is subjoined, and which will be found to point out, in a very satisfactory manner, the practical value of Mr. Edye's communication.

"Before I comply, he says, with the desire of the Council to report on Mr. Edye's Treaties on Indian Vessels, it may be useful to explain how it came into my possession.

"When on a visit to Chatham, Mr. Edye, who is now employed in His Majesty's dock-yard at that place, showed me this manuscript; and deeming it very curious, I beg he would allow me to present it to the Royal Asiatic Society, which might, I thought, consider it worthy of a place in its transactions; not only as it exhibited the actual state of the art of ship-building in India, but on account of the evidence it contained of that art being at the same stage at which it now is, at a period of the most remote antiquity. Mr. Edye's manuscript appeared to me to possess more value from the remarkable fact, that many of the vessels of which he gives us an account illustrated by correct drawings of their construction, are so admirably adapted to the purposes for which they are required, that notwithstanding their superior science, Europeans have been unable, during an intercourse with India of two centuries, to suggest, or at least to bring into successful practice any improvement. I may adduce the Masula boats, on the coast of Coromandel, in proof of this assertion; and, to my knowledge, both talent and skill have laboured in vain to improve the shape and construction of those vessels.

"The Council having referred this paper to me, I shall shortly state its contents, and my opinion of its value.

"Mr. Edye, by a residence of five years in India, as His Majesty's Master-shipwright in Ceylon, had singular opportunities of becoming perfectly informed on the subject of which he treats in this memoir. He describes in a clear and concise manner the various vessels of the coasts of Coromandel, Malabar and Ceylon;

Catamarans.....of Ceylon, the Malabar and Coromandel coasts, &c.

Canoes.....of Point de Galle and the Malabar coast.

Jangar .....of the Malabar coast, for rivers  
Pamban Manche...Snake Boat of Cochin.

Bander Manche...Boats used to load ships and carry goods on the coast of Malabar.

Masula Boats.....Used chiefly at Madras in landing and discharging cargoes, and carrying passengers to and from ships in the roads.

Mangalore Manche } These are coast boats, of  
Calicut Manche... } construction suited to  
Panyani Manche... } the places from which they are named.

Patamar.....Vessels employed in the coasting-trade of Bombay to Ceylon.

Arab Dow.....Vessels employed in the trade between the Red Sea, the Arabian coast, the Gulph of Persia, and the Indian coasts of Cutch, Gujerat and Malabar. These Dows are also used in the Persian Gulph, for the purposes of war and piracy. They are always manned by Arabs.

Baggalah, or } These vessels trade from  
Budgerow..... } Cutch, Gujerat, and the Malabar coast to the Gulph of Persia, the coast of Arabia, and the Red Sea. They are Indian vessels, and manned with Indian seamen, called Lascars.

Doni.....A vessel used in the coasting trade of Coromandel, from which they often carry cargoes to Ceylon and the Gulph of Manaar.

Boatila Manche ...Used in the Gulph of Manaar and the southern parts of the Peninsula, and trading from these to Ceylon.

"The shape and materials employed in the construction of the vessels are minutely stated by Mr. Edye; and the well executed plans and sections of each class, by which their descriptions are illustrated, will, I am assured, attract the particular notice of the Council; to whom I have no hesitation in stating, that I deem Mr. Edye's Treaties highly valuable; and am of opinion, that while it merits attention from those engaged in the study of nautical science, it must be acceptable to antiquarians and philosophers, who seek, by comparisons of the works of man in various ages to draw conclusions as to the

of science merits more of their consideration than that which enabled him to have intercourse with distant nations, and through such means to advance knowledge and civilization!

“JOHN MALCOLM.”

#### MR. EYDE'S PAPER.

Among all the numerous vessels of every class and description which traverse the ocean, there is a peculiarity of form and construction intended to meet the various localities of the ports or seas in which they are navigated; and perhaps in no part of the globe is this principle more fully displayed than in the Indian Seas, and on the coasts of the Southern Peninsula of India, including the Island of Ceylon, where the nature and change of the season, the monsoons, and the navigation of the seas and rivers, are singularly well provided for by the truly ingenious and efficient means adopted by the natives in the formation of their rude, but most useful vessels. I shall endeavour to describe these more explicitly, with the aid of the sketches and designs, the correctness of which I have been most scrupulous to ensure.

#### (443) CATTAMARANS.

The first which I shall describe, will be the Catamarans of the Island of Ceylon, which like those of Madras, and other parts of the coasts of the Peninsula, are formed of three logs of timber, and are used by the natives for similar purposes; the timber preferred for their construction is of the dup wood, or *cherne marum* (piney tree). Their length is from twenty to twenty-five feet, and breadth two and a half to three and a half feet secured together by means of three spreaders and crosslashings, through small holes; the centre log being much the largest, with a curved surface at the fore-end, which trends and finishes upwards to a point. The side-logs are similar in form; but smaller, having their sides straight, and fitted to the centre-log, as will be better seen and understood by the accompanying sketch.

These well known floats are generally navigated by two men; but sometimes by one only, with the greatest skill and dexterity; as they think nothing of passing through the surf on the beach at Madras, and at other parts of the coast, while boats of the country could not live on the waves; and at sea, they are propelled through the water to ships on the coast, when boats of the best construction and form would swamp. In the monsoons, when a sail can be got on them, a small outrigger is placed at the end of two poles, as a balance, with a bamboo mat and yard, and a mat or cotton cloth sail, all three parts of which are connected; and when the tack and sheet of the sail are let go, it all falls fore and aft, alongside; and being light, it is easily managed. In carrying a press of sail they are trimmed by the balance lever by going out on the poles, so as to keep the log on the sur-

face of the water, and not impede its velocity, which, in a strong wind, is very great. They are frequently met in with ten or fifteen miles off the southern part of the Island of Ceylon, and will convey any letter or despatch to the shore with safety: but I cannot say much about its dryness, as the man who takes it has nothing but a pocket made from the leaf of the arca-tree (*A. catechu*, Linn), which is tied round his waist, and is the only article about him. These people may be considered almost amphibious, and are the persons who are employed in the pearl-fishery. They are said to remain under water for fifty minutes; but this I have never heard from themselves, or could find to be correct, as five minutes is the greatest time that has come to my knowledge. In an account of the Ceylon Pearl Fisheries, by Captain James Stuart, inserted in the *Trans. R. A. S.* Vol. III. Part 3. the author states, from personal observation, that the longest time which the divers can remain under water is from eighty-four to eighty-seven seconds. They certainly think nothing of going down to a depth of forty feet; and will bring up a rupee even, if thrown into the sea at that depth.

#### (444) THE POINT DE GALEL CANOE, OR MARKET BOAT,

Is a Boat formed from a single stem of dup wood, or piney varnish-tree. They are from eighteen to thirty feet in length; from eighteen inches to two and a half feet in breadth; and from two to three feet deep; exclusive of the wash board, which is about ten inches broad, and sewed to the gunwale by coir-yarns, with loose coir-padding on the joints, in the same manner as the other boats used in India are sewed together, which will be more fully described hereafter. These boats are fitted with a balance log at the end of the bamboo outrigger having the mast, yard, and sail, secured together; and, when sailing, are managed in a similar way to the Catamarans. Vessels passing the southern part of the Island of Ceylon are generally boarded by these boats even at the distance of twenty to twenty five miles from shore. They will sail at the rate of ten miles an hour in strong winds, which are generally prevalent there; and, with a crew of five men, will carry a cargo of fruit, fish, and vegetable, which are the greatest luxuries to passengers, on making the land after a long voyage from England, Bengal or Bombay. The details of these very interesting vessels will be better understood by reference to the Sketches in Plate II. A model of one of these curious boats is in the Museum of the Royal Asiatic Society to which it was presented by Mrs. Perring. The society is also in possession of a model of a boat having two outriggers, with balance logs, used by the natives of some of the islands in the Eastern Archipelago: this model



was received from H. J. Donis, Esq., P. M. R. A. S., His Netherlands' Majesty's Resident at Sourabaya, in Java. The natives of New Holland appear to use a similar contrivance, but of a more simple construction, as exhibited in models in the Society's possession. The Rev. Richard Walter, in his account of Lord Anson's Voyage, gives a minute account, illustrated by an engraving of what he terms "a flying proa," used at the Ladrone Islands; which is the same, in most essential particulars, as the vessel described above by Mr. Edey. (Vide Walter's Account of Anson's Voyage round the World 4to. London, 1748 p. 339.)

(445) CANOE OF THE MALABAR COAST.

From Cape Comorin to Calicut, on the western side of the Peninsula, the coast abounds with fish, which is generally taken with the hook and line by the natives of the fishing villages, in a small canoe; the best description of which is formed from angeley-wood; *Anjele*—*Artocarpus hirsuta* (?) But the inferior sort of *cherne maram*: they are cut out from the solid tree, and are from eight to twenty feet in length, and from one and a half to two feet in breadth; the depth being about one, or one foot and a half. They are managed with much dexterity by the natives, with a scull-paddle. On the backwater of Cochin, and on the river's mouth, they are employed in great numbers in taking the saire fish or country salmon, &c. The largest sort of boats are used for the conveyance of rice and merchandise on the numerous rivers which disemogue themselves into the back-water, to the extent of 150 miles, parallel to the sea-coast. At times these boats are converted into the

(446) JANGAR,

or Double Platform Canoe, by placing a floor of boards across two boats, with a bamboo railing which extends from ten to twelve feet fore and aft, and sixteen feet long; and when these boats are thus formed into rafts, cattle and burthensome articles are conveyed across the rivers; as also the native regiments, with all their followers, horses, bullocks, baggage, bandies (carts), &c. It appears somewhat probable that the idea of the pontoon now in use at Chatham was taken from these vessels, as those constructed by the engineers there perfectly resemble such as are used by the natives in India.

(447) PAMBAN MANCHE, OR SNAKE BOAT OF COCHIN,

is a canoe of great length: they are used by opulent natives and Europeans, as boats for the conveyance and despatch of persons on the numerous rivers and back-waters, particularly on that between Cochin, Allipey, and Quilon, which is about eighty miles southward; and on that which runs to Rappact and Trichoir; the former place being about twenty, the latter about sixty miles to the northward. These boats are from thirty to sixty

feet in length, without any regard to breadth or depth, as they are worked from the solid tree. The broadest do not exceed three feet. Those of the Raja and officers of state are very handsomely fitted up, and carved in the most fantastical manner: they are made very neat, and even splendid, with painting, gilding, &c. The largest boats are sculled by about twenty men, double-banked; and when pressed, their velocity is surprising, as much as a mile in five minutes. I have myself been sculled, in one of them, a distance of forty-eight miles in six hours. These boats are peculiarly adapted to the rivers; for it frequently occurs, that in the dry season there are sand banks perfectly dry, nearly a hundred yards in breadth, over which they must be drawn by the strength of the few men who are in them; the smaller size having only six rowers and a coxwain. Those natives who can afford the expense, have the cabin neatly fitted up, with venetian blinds on the sides, but generally the cuscus, or grass-mat, is substituted. This boat is formed from the angeley-wood, which is very durable, if kept oiled.

(448) COCHIN BANDAR-MANCHE, OR CANOE OF BURTHEN.

These canoes are cut and formed from the largest and softest timber of the forest. They are from twenty to fifty feet in length; their breadth and depth being proportioned to the full size of the tree so as to reduce its dimensions as little as possible. They will carry about eighteen tons burthen, and are made from three to five inches thick at the bottom; but at the top of the side, or gunwale, about one and a half to two inches, with a proportionate increase of thickness at the extreme ends, to protect the end-grain of the wood, and withstand any shock that they may meet with. At the distance of about five feet on the inside there are ribs about six inches broad, projecting about two inches from the side of the boat, for the purpose of giving support and strength to the body of the canoe. These boats may be considered valuable for the service of the port at which they are used; and notwithstanding their heavy appearance, they are very buoyant, and go very fast through the water. In one of about thirty-five feet long, with six men and a tindal (coxwain). I passed the Minden's (the Admiral's ship) barge, which had twelve men on board; and in a distance of four miles to that ship's anchorage, I gained on them by time about twenty minutes, although there was a strong sea-breeze and swell against us.

At Cochin, these boats are used for the purpose of conveying various articles of burthen and water to the ships in the roads. This is well known to the homeward bound ships from Bombay, and those bound from the Red Sea and Arabia to Calcutta; as they generally call off this port, for supplies of every sort. Two

of the larger size were sent, by order of Commissioner Upton, to Trincomalie, for the use of the dock-yard; and after being constantly used during four years, for the purpose of carrying stones, bricks, sand, coral, &c. across the bay, they were left, when the establishment was broken up in a sound and complete state; which circumstance may be attributed to their having had copper sheets put on their bottoms, to protect them from the worms. The expense of each canoe was about eighteen pounds sterling; and they would convey from twelve to twenty tons, each boat.

It would be worthy of consideration, and a great service to the navy, to have one of these boats, with a native crew, attached to each ship; for the purpose of saving the seamen, and ships-boats, from exposure to the intense heat of the surf, the bad effects of which are so very sensibly felt by Europeans at all times.

#### (449) THE MADRAS MASULA MANCHE,

Is formed with a flat bottom, for the purpose of taking the beach in the surf, when European boats cannot approach it. These boats are beached in the third surf; and taken most completely out of the water, on the immediate receding of the swell by natives.

The planks which form these boats are sewed together with coir yarns, crossing the seams over a wadding of coir, which presses on the joints, and prevents leakage. By this peculiar means of security, the vessel is rendered pliable, and yields to the shock which she receives on taking the ground; whilst boats with framed timbers and planks, nailed or trenail-fastened, would be broken to pieces, from the heavy surf, that at times runs as high as from six to ten feet. The Catamaran can be kept in attendance, as a life preserver, in the event of any accident to the masula-boat, by upsetting; or in case of any of the Europeans being washed out by the surf.

The masula-boats receive their cargoes and passengers from the ships outside the surf; and land them in perfect safety, provided the crew be treated with civility; if otherwise, they will not fail to moisten the offender, to such a degree as to shew the passengers that they are in their power, and make them objects of derision to the men on the beach. These boats are rowed by twelve men, in double banks, with bamboo paddles; that is, a board about ten inches broad and fourteen inches long, fixed at the end of a bamboo. They are steered by two tindals (coxwains) and two men are constantly kept to bale out the water; from which employment they are promoted to the paddle, or bow-oar; after which they fall off, in rotation, to be a tindal or steersman. The steersman gives time by a song, which is sung by all the boatmen; and according as its modulations are slow or quick, the oars are plied. These modulations are regulated by the waves, as they may be slow or rapid, in succes-

sion. I remember, on one occasion, when a passenger of rank showed impatience at this noisy song, the boatmen were desired to cease; but the steersman refused compliance with the order, saying, that without his song he would not be answerable for the safety of the passenger.—(Note by Sir J. Malcolm.) The dimensions of the masula-boat are from thirty to thirty-five feet in length, ten to eleven feet in breadth, and seven to eight feet in depth: the details of their form will be understood from the drawing.

#### (450) MANGALORE MANCHE,

Is a flat bottomed boat of burthen, about twenty-five to thirty-five feet long, six to seven feet broad, and four to five feet deep. It is formed to meet the river, which is very shallow and flat; and to land the cargoes of the patamars, which are discharged and loaded at the mouth of the rivers. These boats are sewed together similar to the masula-boat and other native vessels: they are forced along by bamboo poles; as the water is not more than from six to ten feet deep, except in the southwest monsoon, when the rapids swell; and the whole of the river is considered impassible; and at this period all the vessels are taken to the shore and laid up.

#### (451) CALICUT MANCHE,

Is a boat very similar to that of Mangalore with the exception only of a raking stem, for the purpose of taking the beach; as the port of Calicut is open to the coast and there is no river. These boats are propelled by the paddle and sail and generally carry eight men: they are much employed in watering and completing the sea-stock of ships homeward-bound; also in loading ships with pepper, timber, &c., for Bombay; and in shipping the produce of the forests of Canara and Malabar, for the naval yard of the East India Company; all of which is rafted off to vessels called dows, boatiles, patamars &c., hereafter described.

#### (452) PANYANI MANCHE,

Is a coasting boat, of about fifty feet long, ten to twelve feet broad, and five to seven feet deep. It is framed with timbers and planks; which are sewed together, as before described. The timbers are about four feet asunder, and on them inside, some few planks are placed as bands and clamps, which are nailed to the frame. These are very rudely put together; and not of much importance, either in form or construction. During the south-west monsoon, or from June to November, they are laid up at Baipur river for safety, and are only used in the fine-weather season. They carry the productions of the coconut tree, viz. coir, [coir is the husk of the coconut (*Cocos nucifera*), from which rope is made.] Copra, [copra is the inside or fruit of the nut, from which oil is expressed.] Cajan, [cajan is the



leaf of the tree (*Corypha umbraculifera*) which is used for coverings of houses; also for books, and various other purposes. Jageri, [Jageri is a kind of sugar, which is made from the toddy or juice of the Palm.] Oil and Arrack, [arrack is a strong spirit, distilled from the toddy taken from the Palm] to Cochin and Mangalore; and, from these parts rice, cloth, salt, &c. These vessels keep along shore and take advantage of the sail in rowing. They have generally from eight to ten men, who are fishermen, of the Mopila caste. A race of Musalmans, descendants of the first Arabian settlers on the shores of the peninsular; and who marrying the daughters of the country, obtained the name of Mápillai, or "sons-in-law," corrupted by Europeans into the above term.

## (453) THE PATAMARS,

Are a class of vessels which may be considered the best in India; as they sail remarkably well, and stow a good cargo. They belong principally to Bombay merchants, and carry on the whole of the coasting-trade to that port. They are grab-built: that is, with a prow stern, which is the same length as the keel; and the dimensions of the large class are seventy-six feet six inches in length, twenty-one feet six inches in breadth, eleven feet nine inches in depth, and about two hundred tons burthen. They are planked with teak, upon jungle-wood frames; and are really very handsome vessels, being put together in the European manner, with nails, bolts, &c. and their bottoms are sheathed with inch-board, and a layer of chunam mixed with cocoa-nut oil and a portion of damar (country resin): this is a very durable substance, and a great preservative to the plank against worms.

Some of the smaller class of these vessels, of about sixty tons burthen, are sewed together with coir, as other native boats are. The small class has one, and the large class two masts, with the lattan sail: the foremast raking forward, for the purpose of keeping the ponderous yard clear when it is raised or lowered. The yard is slung at one third of its length, the tack of the sail is brought to the stern-head, through a fixed block; and the sheet hauled aft at the side, as usual. The haul yard is a pendent and treble block, from the mast head aft to midships; thus acting as a back-stay for the mast's security, together with about two pairs of shrouds. These vessels generally export salt from Bombay to the coast, and take back coir, rice, cocoa-nuts, copra, oil, timber, sandalwood, pepper, and various articles, the production of the coast. They are navigated with much skill, by men of the Mopila caste and other Musalmans; and have a crew of ten or twelve men, and a tindal, who are good pilots and navigators off the coast from Bombay to Cape Comorin; generally speaking, honest and trustworthy; and very respectful to Europeans.

## (454) THE ARAB DOW,

Is a vessel of about one hundred and fifty to two hundred and fifty tons burthen, by measurement; grab-built, with ten or twelve ports; about eighty-five feet long, from stern to stern; twenty feet nine inches broad; and eleven feet six inches deep. Of late years, this description of vessel has been built at Cochin, on the coast of Malabar, most perfectly, in the European style. These vessels have a great rise of floor; are calculated for sailing with small cargoes; and are fully prepared, by internal equipment, for defence, with decks, hatchways, ports, poop-deck, &c., as shewn by the sketch, which, it will be seen, is that of a vessel of war; many of them are sheathed, on two-and-a-half-inch plank bottoms, with one inch board, and the preparation of chunam and oil, as before described, which is called galgal, put between the planks and sheathing-board, causing the vessel to be very dry and durable; and preventing the worm from attacking the bottom.

The worm is the one of the greatest enemies in India to timber in the water, while the white ant is as much so out of it. On the outside of the sheathing board there is a coat of white-wash, made from the same articles as that between the sheathing and planks; which coat is renewed every season they put to sea. These vessels have generally one mast, and a latteen-sail: the yard is the length of the vessel aloft; and the mast raking forward, for the purpose of keeping this ponderous weight clear, in raising and lowering. The tack of the sail is brought to the stern-head, and sheets aft in the usual way; the halyards lead to the taffrail, having a pendent and treble purchase-block, which becomes the backstay, to support the mast when the sail is set: this, with three pairs of shrouds completes the rigging; which is very simple, the whole being of coir-rope.

Several of these vessels have been fitted as brigs, after their arrival in Arabia; and armed by the Arabs for cruising in the Red Sea and Arabian Gulf, as piratical vessels: they are also the class of vessels of which Tippu Sultan's at Onore consisted. When armed, they are too powerful for the Bombay marine brigs. This has never happened, but when in great numbers, and the brigs weak and unsupported.—(Note by Sir. J. Malcolm.) The large dows make generally one voyage in the season, to the southward of Arabia; taking advantage of the north-east monsoon to come down, and the south-west to return with an exchange cargo. They generally bring dates, fruit, preserves, Shiraz-wine, and horses; and take back rice, coir, canvas, cocoanuts, oil, timber, damar, &c., various articles of cloth of the country manufacture, and from Bombay. European articles of every description. The trade of this part of the country is very great in those vessels; ex-

tending from Allipey, the southernmost port on the coast of Malabar, up to Bombay: but all the trade to Bengal is carried on by ships which are called "Country Traders," from the Gulf of Persia and Arabia. The Arabs are a powerful, well grown, handsome people, and very acute and intelligent in trade. They usually navigate their ships to Bengal in perfect safety, and with great skill: This was well known to Captain Collier and his officers, of the Liverpool frigate, when they had the trial cruise with Imam of Mascat's fine frigate, in 1820.

(455) THE BAGGALA, OR BUDGEROW,

Navigates the Indian seas from the Gulf of Cutch and is one of the most ancient vessels there to be met with. Their extreme length, from stern to taffrail, is about seventy-four feet, the breadth about twenty-five feet, and the depth in hold eleven feet six inches, with about one hundred and fifty tons burthen. The peculiarity of form and extraordinary equipment of these vessels is said to have been the same from the period of Alexander the Great: they are armed with two guns on the after part or right-aft of the stern for defence against pirates; and have their poop-decks with a round stern: their extreme sections about the centre or middle of the vessel: they are very broad in proportion to their length, with a sharp rising floor: the stern is straight, and rakes very little more than the stern-post. The form of the vessel, however, will be better understood by a reference to the drawing.

These vessels are constructed with timbers and planks, which are nail and trenail fastened, in the most rude and unsafe manner possible. The topside above the deck is barricaded with mats on the outside of the timbers, which run up to about eight feet from the deck; and when they have no cargo on board, this barricade is removed.

They have only one mast; with a huge yard made from two spars, the small ends lashed together, and a latteen sail, the tack of which goes to the sternhead, as in the other vessels before described: they generally trade like the Dows; and are navigated by Arabs and the people of Cutch.

This singular and rude vessel, as well as the Arab Dow, is peculiarly adapted to the coasts of Arabia and the Red Sea, which are subject to periodical winds during which these vessels are navigated with much ease.

(456) THE DONI,

of the Coromandel coast is a huge vessel of the ark like form, about seventy feet long, twenty feet broad, and twelve feet deep; with a flat bottom or keel part, which at the broadest place is seven feet; and at the fore and after-parts of the vessel it breaks into ten inches, which is the siding of the stem and stern-post. The fore and after bodies are similar in form, from midships.

Their light draught of water is about four feet: and when loaded, about nine feet. These rude unshapely vessels trade from Madras and the coast to the Island of Ceylon; and many of them to the Gulf of Manar, as the water is shoal between Ceylon and the southern part of the Continent. They have only one mast, with a long sail; and are navigated from land to land, and coastwise, in the fine season only.

It may not be uninteresting to know the means used, by the people who navigate these vessels, to find the rate of current in the Bay of Bengal, which is very great at the change of the season or monsoon, as much as sixty miles in twenty-four hours. When they are off a port, in a calm, they throw a handful of sand or shells and feathers, in the calm sea; and by the drifting of the feathers on the surface, and sinking of the sand or shells, a calculation of the rate of current is formed, and they anchor off the coast accordingly.

The anchor is made, in the most simple way imaginable, by lashing together three crooked branches of a tree, which are then loaded with heavy stones; and their cable is formed from coir-yarns. In fact, the whole equipment of these rude vessels, as well as their construction, is the most coarse and un-seaworthy that I have ever seen, and far behind those of any other part of India.

(457) THE BOATILA MANCHE,

Of the Island of Ceylon, which navigates the Gulf of Manar, and the southern part of the Peninsula of India. This boat, which is about fifty to sixty feet in length, sixteen to eighteen feet in breadth, and eight to ten feet in depth, has more of the European form than any of the Indian-built vessels that are met with. The after part shews the origin to be of Portuguese construction, as it is very similar to that of many of the boats still in use by the people of that country; which are said to be of the same shape as the vessels in which Vasco De Gama sailed to India.

They have a deck fore and aft; and are built with all sorts of jungle-wood, in a very rough manner, and fastened with nails and bolts. They are equipped with one mast, which inclines forward, and a square lug-sail; also a small bowsprit, at about the angle of 45°, with a sort of jib fore-sail, one pair of shrouds, and a back-stay which completes the rigging. These vessels carry on the trade of the island across the Gulf. The exports are, rice, tobacco, &c. and the imports, cloth. This forms a great part of the revenue of the island, in the district of Jaffnapatam.—*Mr. Edye on the Native Vessels of India and Ceylon, in the Journ. of the Royal Asi. Socy. No. I. July 1834, page from 1 to 14.*

(485) BOATS.

on the Ganges are of various descriptions, the Bugerow, the Boleah, the Panswah.



(459) BOMBAX CEIBA. *The silk Cotton tree*, adorns many parts of the Burmese country. It is one of the largest trees, and its beautiful and soft floss is used for pillows, and thin mattresses by the natives; *Malcom's Travels in South Eastern Asia*. V. 1. p. 187. The juice of the root is aperient and its bark emetic.—*Voigt*.

(460) BOMBAX GOSSYPIUM. Under this name, mention is made by Mr. Rohde of a large beautiful tree, a native of the Circar mountains and cultivated in gardens on many parts of the Eastern coast of the peninsula of India where it bears bright yellow blossoms. The cotton is soft and silky—the wood is soft and of but little if of any use.—*Rohde, M.S.S.*

(461) BOMBAX MALABARICUM Syn. BOMBAX HEPTAPHYLLUM.

Boorooga Chettoo, TEL. | Rueta Semul, also  
Poolamarm, TAM. | Semul, BENG. HIND.

This one of our largest peninsular coast trees, is found every where but is of very great size in the neighbourhood of the Circar mountains where it is often one hundred feet high. Flowering time the end of the cold season, when the tree is generally destitute of leaves it is then covered with bright red flowers. The wool of this species does not adhere to the seeds, and is used to stuff beds and pillows in preference to cotton.

The wood is white and light but watery and spongy and fit for very few purposes, scarcely even for fuel.—*Rohde, M.S.S.*

(462) BORAX. Sub-boras sodæ.

Velligarum, TAM. | Booruc, ARAB.  
Sohaga, DUK. and | Tunkar, PERS.  
HIND. | Paterree, MALAY.

According to Ainslie, borax is found in Thibet, and in Persia, whence it is brought to India; and the Abbe Rochon, in his voyage to Madagascar and the East Indies, informs us that it can also be procured of a superior quality, in China.—*Ainslie's Materia Medica*, p. 6.

(463) BORNEO is divided by the equator into two unequal and extended parts, of which the southern is the larger. This island is the greatest on the globe after that new world, surrounded on all sides by the ocean, which is named new Holland. If we comprise the numerous archipelagoes by which the great land is environed, this group may be said to occupy more than eleven degrees of longitude and about ten of latitude. The geographical position of the principal island is between 7° N. L. and 4° 20' S. L. and between 106° 40' and 116° 45' E. Lon. Its length from north to south will be about 300 leagues and its breadth varying from 250 to 150 leagues. Its superficies has been estimated at 13,342 square geographical leagues; the more exact calculation which Mr. Melvill de

Carnbee has published in *Le Moniteur des Indes* gives Borneo a surface of 12,741 square leagues or 6,992 myriametres; which makes it 2,589 myriametres greater than Sumatra, and 5,723 myriametres greater than Java.

Old documents make known to us that the Portuguese Lorenzo de Gomez was the first of the European navigators who approached the northern part of this island; he arrived in 1518 in the ship St. Sebastien on his route to China. We presume that he gave to the country the name of Burne, but he says that the natives term it Braunai or Brauni. The travellers who have recently penetrated into different parts of the interior, the Dutch Major, Muller, Colonel Henrici, the members of our scientific commission, Diard, S. Muller and Korthals, as well as the Rajah Brooke, assure us that the Dayaks which form the aboriginal population of Borneo, do not use, and cannot even have any idea of a specific name appropriated to the whole extent of a country of which the sea bord is even most often unknown to the savage and wandering tribes who are separated by great distances from each other, and who are dispersed in hordes of small numbers over the vast extent of one of the largest islands in the world. These different tribes are designated amongst themselves by the names which they give to the rivers on the borders of which they have establish their abode; it is thus that all the Dayaks of the great river Dusen (the Banjer of our maps) call themselves Orang Dusen (men of Dusen) and those of the river sampit, Orang Sampit; the manuscript memoirs of Major Muller and of Colonel de Henrici make mention of a great number of tribes designated by the names of rivers which have their mouths on the western coast; in the north of Borneo Mr. Brooke makes mention of Dayak tribes under the names of Sarebus, Sakarran, Lundu, Sibmuw &c. established on the rivers which bear those names.—*Journ. of the India Archipel. Vol. II. No. VI. June 1848, page 365.*

The coal and iron fields of the Balawi or Rajang are more extensive than any yet discovered on the Island. From the river Baram, coal is traced to the upper parts of the Bintulu, and thence southward to the Rajang river, on the left bank of which, at Tujol Nang, there is a seam exposed upwards of thirteen feet in thickness. At different other parts of the river and also in several of its branches coal is found in abundance. From Tujol Nang the strike of the coal is southward across Dragon's plain. It is again found in the river Lang Pila (a distance from the former place of about fifty miles) where it is extensively exposed on the surface, and has been in a state of ignition for several years. Iron ore of a quality yielding from

## BOUEIA.

sixty to eighty per cent of iron abounds in the Baluwi or Rajang district, from about forty miles from the coast to the source of the river, or over a district comprising nearly one-half of the extreme breadth of the island. The iron manufactured from the ore of the above district is much preferred to that of Europe by the Malays and other natives of Borneo as being superior. If such be the case it is certainly worthy of notice. If the ore of Borneo, by the rude manner of smelting practised by the Kayans, make better iron than that of England, with all the advantages possessed by the smelting of that country, we must infer that if the science and superior genius of Englishmen were employed in the preparation of iron from the rich mines of Borneo, this valuable metal could be produced cheaper, in quantity greater, and quality superior, to that for a scanty supply of which the trade of Great Britain is dependent on the arbitrary monopolies of Sweden.—*Jour. of the Indian Archipelago Vol. iii. No. iii. Feb. 1849.*

(464) BOS, At the Paris Exhibition of 1855, there were exhibited of *Bos taurus* diverse varieties.

Gour (*Bos cavifrons*);

Buffalo (*Bos bubalus*);

Arni (*Bos Arni*);

Gyal (*Bos frontalis*).

Amongst the animals who infest the forests of Nepaul, is one of the largest of the wild ox tribe known, measuring at the shoulder from eighteen to twenty hands and of great power. The bull is a very ferocious animal, it is called by the Nepaulese the Ghowrie Ghai. The body is of a brownish blue colour to the knee, and from that to the hoof white, with a very formidable pair of horns, about two feet long, and of about eighteen inches in diameter at the roots. From the root of the horns to the back of the neck, a strong oily substance is emitted with a very powerful musky smell. A more formidable animal than the bull there is not to be found in the Nepaul forests; no tiger dares to approach a full grown one, and two of them have been known to drive off a rhinoceros.—*Smith's Nepaul.*

(465) BOUEIA, Meisner: CAMBESSEDIA, Wight and Arnott. *Boueia burmannica*. *Mangifera oppositifolia*. *Roxb. Hort: Bengh, p. 18 Fl. Ind. 1 p. 640. Ed. Carey*; *Manga sylvestris* Rumph. *Hb. Amb. 1, t. 27?*

Mariam also Mai-ten, BURM.

Commonly cultivated by the Burmese. It is a small tree, leaves narrowly oblong lanceolate, obtusely acuminate or cuspidate, leathery, in length 5 inches and  $1\frac{1}{2}$  broad. Stamens, oftenest 4. Drupe the size of a hen's egg.

(466) BOUEIA MACROPHYLLA.

Roomaniya Baitool, MALAY.

This inhabits Malacca.

## BRASS.

(467) BOUEIA MICROPHYLLA.

Roomaniya Taigo, MALAY.

The habit of these two species is different from that of the Burmese one, the leaves more coriaceous, and the secondary veins more distinct. The fruit of both is eaten by the Malays. They have the characteristic acidity, but make excellent pickles. *Cantor.—Ben. As. Soc. Jour. 1854.*

(468) BOSCA TRINERYA.

Mentioned by Roxburgh as a large tree a native of the Circar mountains: the tree is not known nor if it be used in the arts.—*Rhode, M. S. S.*

(469) BOSWELLIA GLABRA.

Googoolapoo chettoo, TEL.

This tree yields a resin, which is used as incense and for pitch in some parts of India. It is a native of the mountainous districts of Coromandel.—*Roxb. Rhode, M. S. S.*

(470) BOSWELLIA THURIFERA. CANARIUM HIRSUTUM C. ODORIFERUM.

Salaec, SANS.; Salai, BENG.; Luban, HIND.

In Telooogo, the tree, Koondooroo, a large timber tree a native of the mountainous parts of Coromandel, Bundelkund &c. said to be the tree producing the frankincense of the ancients.—*Rhode M. S. S.*

The *Boswellia thurifera*, the Frankincense or Olibanum-tree, is very common on the Ajmeer hills, and elsewhere, the wood is cheap and very worthless. The tree yields abundance of gum resin, but it is not gathered or put to use at Ajmeer. The tree is very abundant and the natives of Ajmeer call the resin "luban" from which an excellent clear turpentine might be distilled.—*Gen. Med. Top. p. 192*

(471) BRAHMIN. Ward in his work on the 'Literature and Mythology of the Hindoos,' mentions the confession of faith of a Brahmin, which he gave him, "God is invisible, ever living, glorious, uncorrupt, wise, the ever blessed, the Almighty, his perfections are inconsiderable and past finding out. He rules over all, destroys all, and remains after the destruction."—*Chow-Chow, p. 44.*

(472) BRALLAH, the Malayala name of a tree that grows on the Malabar coast to about eight inches in diameter, and sixteen feet high. It is used by the natives on the coast for boats; and for timbers and knees in larger vessels: it is considered strong and durable.—*Edye, M. and C.*

(473) BRASS.

Pettalie, TAM.; Itarie, TEL.; Peytal, HIND.

The Brass so much used in India for pots by the natives generally is of a very inferior de-



## BRASS.

scription, the workman who forms it with proportions of copper and zinc finding it profitable to employ an undue proportion of the cheaper metal; good malleable brass is found in old pots occasionally, probably from the number of times it has been melted and worked up causing the metals to combine more perfectly and the excess of zinc to be expelled by frequent heatings. In Europe brass was prepared generally by cementation, the fumes from calamine, the ore of zinc acting upon heated copper plates. The best brass may be made by fusing two parts of copper and one of zinc, various proportions being used according to the purpose required.

Copper, Ragi, TEL.		Lead, Sheesham, TEL.
Zinc, Sattu, TEL.		Antimony, Soorma, TEL.
Tin, Tagarum, TEL.		and HIND.

are the metals used in various proportions by native smiths to form brass. Gun metal, *lokam*, pewter *Satke*, bell metal, *kansu*, Biddery ware, and occasionally silver, is added to form gongs and bells. In general, however, the proportions used are regulated by reducing the proportions of the more expensive and increasing those of the cheaper metal as far as may be practicable. Repeated meltings by drawing off the excess of zinc leave a good malleable brass, and for this reason old brass is much sought after by smiths when they desire it for any work requiring it to be particularly malleable. They frequently use equal parts of zinc and copper, the proportion of zinc is necessarily much reduced by their mode of melting, still the product is a very inferior brass. Guns taken at Kurnool were little better than spelter.

The following proportions have been taken from C. Holtzapfel's remarks on copper alloys, the quantities shew the proportions to 1 lb. of copper;  $\frac{1}{2}$  to  $\frac{1}{2}$  oz. zinc is added to copper when used for castings, as pure copper generally does not cast sound: the usual mode is by adding 2 to 4 oz. brass to 1 lb. 6 oz. copper, brass that bears soldering well, Bristol brass is said to be of this proportion.

8 oz. ordinary brass less fit for soldering than 6 oz. being more fusible.

9 oz. to 16 oz. Muntz patent sheathing 40 zinc to 60 copper is the best proportion, it is cast in ingots, heated to a red heat, and at that heat rolled and forged for bolts &c.

12 oz. spelter for soldering iron pale yellow metal for dipping in acids is in this proportion. 16 oz.—soft spelter solder for ordinary brass work, 2 oz. copper to 1 lb. zinc a hard crystalline metal used for laps, polishing dishes &c.

The red color of copper slides into that of yellow brass at about 4 or 5 oz. to the lb. and remains little altered to 8 or 10 oz. after which it becomes whiter.

The alloys from 8 to 16 oz. are much used for furniture work, in all cases the metal is annealed

## BRASS.

before the application of the scouring or cleaning process.

The alloy of zinc and copper retain there malleability and ductility well to about 8 or 10 ounces to the pound, after this the crystalline character begins slowly to prevail.

The ordinary range of good yellow brass that files and turns well is from about  $4\frac{1}{2}$  to 9 oz. to the pound.

## ALLOYS WITH TIN.

- 1 oz. of tin to 1 lb. Copper—a soft gun metal.
- $1\frac{1}{2}$  „ harder, fit for wheels to be cut with teeth.
- $1\frac{1}{2}$  „ to 2 oz. Brass ordnance.
- 2 „ hard bearings for machinery.
- $2\frac{1}{2}$  „ very hard do
- 3 „ Soft musical bells.
- $3\frac{1}{2}$  „ Chinese gongs and cymbals.
- 4 „ house bells.
- $4\frac{1}{2}$  „ large bells.
- 5 „ largest bells.
- $7\frac{1}{4}$  „ to  $8\frac{1}{4}$  Speculum metal.

The tin alloy is scarcely malleable at 2 ounces, it soon becomes very hard, brittle and sonorous; alloys of  $1\frac{1}{4}$  cwt. to  $2\frac{1}{2}$  easily assume the maximum of hardness without being crystalline.

Native smiths render the mixed metal malleable with greater proportions of tin, so do the Chinese for their gongs and Cymbals by gently striking it while hot at repeated heatings: some years ago bronze sheathing for ships was prepared on the same principal. Natives call such malleable bell metal *akkansu* (Tel). Is is formed into vessels for containing acid food, buttermilk &c.

## WITH LEAD.

1 lb. of Copper to 2 oz. a red colored ductile alloy.

6 oz. common pot metal is brittle when warmed.

The alloy with lead chiefly used on account of the facility with which it can be turned or filed.

## WITH ZINC, TIN AND LEAD.

$1\frac{1}{2}$  oz. tin,  $\frac{1}{2}$  Zinc, 16 copper, Pumps and works requiring great tenacity.

$1\frac{1}{2}$  tin and 2 oz. brass to 16 Copper, Wheels to be cut into teeth.

2  $1\frac{1}{2}$  16 for turning work.

$2\frac{1}{4}$   $1\frac{1}{2}$  16 nuts of coarse threads and bearings.

Melt the copper alone, the brass in a separate crucible, the tin in a ladle, the two latter are added to the copper when it is removed from the furnace the whole are stirred together and poured into the moulds.

Ordinary yellow brass is rendered very sensibly harder by a small addition of tin say  $\frac{1}{2}$  or  $\frac{1}{4}$  oz. to the lb., on the other hand by the addition of a like quantity of lead it becomes more malleable and cuts sharply. Brass becomes a little whiter for the tin and redder for the lead, the addition of nickel to brass constitutes German silver.

Gun metal (copper and tin) by the addition of

a small proportion of zinc mixes better and the malleability is increased without materially reducing the hardness.—Lead in small quantities improves the ductility of the metal, but at the expence of its hardness and colour, it is seldom added.

Pot metal (copper and lead) is improved by the addition of tin and the three metals will mix in almost any proportions—Zinc may be added to Pot metal in very small quantity, but when the zinc becomes a considerable amount the copper takes up the zinc forming a kind of brass and leaves the lead at liberty, which in a great measure separate in cooling. Zinc and lead are indisposed to mix alone, though a little arsenic assists their union by “killing” the lead as in shot metal; antimony also facilitates the combination of pot metal,—7 lead 1 antimony and 16 copper mixed perfectly at the first fusion, and the mixture was harder than 4 lead and 16 copper and apparently a better metal.

This information is chiefly from Holtzapfel's mechanical manipulation a work which no person who attempts to improve native artificers should be without.—*Rohde, M.S.S.*

(474) *BRIDELIA MONTANA*: *CLUYTIA MONTANA*.

Patenga, TEL.

On the interior of mountains in the Circars this grows to be a tree, but on the lower lands it does not grow so large. The wood of this tree is very hard and of a reddish colour.—*Rohde, M.S.S.*

(475) *BRIDELIA SPINOSA*. *CLUYTIA SPINOSA*.

Koromana, TEL.

This is a tree of considerable size, a native of Circar mountains as well as of various parts of Bengal where it blossoms during the rainy season, chiefly in July, and the seeds ripen in December. The bark is a strong astringent. The wood dark coloured, hard and durable. Cattle eat the leaves greedily, they are said to destroy worms in their bowels, *Roxb.*—*Rohde, M.S.S.*

(476) BROTHER MAKING amongst the KYANS. The late Mr. Burns, thus related the ceremony. Singuding sent on board to request me to become his brother, according to Kyan fashion. The ceremony of becoming Singuding's brother he continues, came off to-day. It is called by the Kyans “berbiang,” by the Borneons “bersabibah.” I landed with our Nakodah, and after some preliminary talk, to allow the crowd to assemble, the affair commenced, we sat in the verandah of a long house, surrounded by some hundreds of men, women and children, all looking eagerly at the white stranger who was about to enter their tribe. Stripping my left arm, Kum Lia took a small piece of wood, shaped like a knife blade, and slightly piercing the skin brought blood to the surface, which

he carefully scraped off; then Nakodah Gadore drew blood in the same way from Singuding's right arm the one next me, and a small cigarette being produced, the blood on the wooden blades was spread on the tobacco, scarcely spread for the quantity was as small as could be imagined. A chief then rose, and walking to a sort of window, looked full upon the river, and invoked the spirits of good and evil to be witness of this tie of brotherhood; the cigarette was then lighted, and each of us took several puffs, and the ceremony was over.

The most remarkable ceremony is the one mentioned by Dalton, of the skewers; here they use copper, the bones of birds and monkeys, and hardwoods. The ceremony, I heard, took place after the birth of the first child, but from subsequent enquiries I find that is immediately after they have tunaged with a girl; that unless the lover submitted to it the girl would have nothing to say to him, that they measured the length of the skewers to be used by the length from the first to the second joint of the woman's third finger; that a great chief often used three, some two, others one, and that it never seemed to injure them in the slightest degree.—*Journ. Ind. Arch. Vol. V. No. XII.*

(477) *BUCHANANIA LATIFOLIA*.

Piyali, SANS, and BENG.	Charoo Mamidi, TEL.
Peeyar, Peeyal, Piyaloo,	Mowdo, or Kati Mango
HIND.	Maram, TAM.

*The Fruit.*

Chirika, SANS. | Chirongi, BENG.

A large tree, a native of the various parts of the coast. The wood of this tree is used for various purposes, and the kernels are a very general substitute for almonds.

From trial made of the quantity of oil that the kernel of the nuts of the *Buchanania latifolia* (Cherongy) would yield, there was obtained an English pint from two seers of seed.—*Rohde, M.S.S.*

(478) BUDIH. According to the Buddhist doctrine, matter is eternal, the existence of a world, its duration, destruction and reproduction, all the various combinations and modifications which matter is liable to, are the immediate result of the action of eternal and self existing laws.

The Trai Phum, a Buddhist work of Siam, is much venerated there. It is not an original work, received among the immense collection of canonical Buddhist books, called *Trai Bido* (in Burman *Bedegat*), but a compilation as we learn from the introduction to it, made in the Buddhist era 2326, (A. D. 1784, 67 years ago) when his Majesty, the great grandfather of the present king of Siam, in the presence of his nobles and retinue proposed a series of questions to the chief Hierarch, priests and learned men, some of which they were able to answer,



## BURNING AND KRISING.

and some they could not answer.—*Reed. J. T. Jones in Journal Indian Archipelago Vol. V. No. IX.*

(479) BUNGA PUKUL AMPAT, MALAY. MIRABILIS JALAPA, See MACASSAR.

(480) BUQR-EED, or Eed oos Zoha, held on the 9th day of the twelfth month Buqreed, on this occasion, Kings, princes, or Nabobs proceed to the Eed-gah in great state, when the khoot-bah is read in the name of the ruling sovereign.

(481) BURNING AND KRISING of Widows at the island of Lombok. On Lombok wives may suffer themselves to be burned after the death of their husbands. They are not compelled to do so. Such an event very seldom occurs, and during one traveller's stay there was only a single widow who allowed herself to be kried. They have the choice of allowing themselves to be burned, or kried. The first is the more rare. The wives of the Rajas, however, must suffer themselves to be burned. When a Raja dies some women are always burned, even should they be but slaves. The wives of the priests never kill themselves. Having been present at one of these horrid spectacles I shall, he adds, relate how it was conducted.

The gusti who died at Ampanan left three wives. One of them resolved to let herself be kried in honor of him, and that against the will of all on both sides of her family. The woman was still young and beautiful; she had no children. They told me that a woman who under such circumstances, suffered herself to be killed had indeed loved her husband. She intended to accompany him on his long journey to the gods, and she hoped to be his favorite in the other world.

The day after the death of the gusti, his wife took many baths; she was clothed in the richest manner; she passed the day with relatives and friends, drinking, chewing sirih and praying. About the middle of the space before the house they had erected two scaffoldings or platforms of bambu of the length of a man, and three feet above the ground. Under these they had dug a small pit to receive the water and the blood that should flow. In a small house at one side and opposite these frame works were two others entirely similar. This house was immediately behind the *bali-bali*.

At four o'clock in the afternoon men brought out the body of the gusti wrapped in fine linen, and placed it on the left of the two central platforms. A priest of Mataram removed the cloth from the body while young persons hastened to cover the private parts of the dead with their hands. They threw much water over the corpse, washed it, combed the hair, and covered the whole body with *châmpakâ* and *Kânangâ* flowers. They then brought a white net. The priest took a silver cup filled with holy water (called *chor*) on which he strewed flowers. He first sprink-

## BURNING AND KRISING.

led the deceased with this water, and then poured it through the net on the body, which he blessed, praying, singing, and making various mystical and symbolical motions. He afterwards powdered the body with flour of coloured rice and chopped flowers, and placed it on dry mats.

Women brought out the wife of the gusti on their crossed arms. She was clothed with a piece of white linen only. Her hair was crowned with flowers of the *Chrysanthemum Indicum*. She was quiet, and betrayed neither fear nor regret. She placed herself standing before the body of her husband, raised her arms on high, and made a prayer in silence. Women approached her and presented to her small bouquets of *kembang spatu*, and other flowers. She took them one by one and placed them between the fingers of her hands raised above her head. On this the women took them away and dried them. On receiving and giving back each bouquet the wife of the gusti turned a little to the right, so that when she had received the whole she had turned quite round. She prayed anew in silence, went to the corpse of her husband, kissed it on the head, the breast, below the navel, the knees, the feet, and returned to her place. They took off her rings. She crossed her arms on her breast. Two women took her by the arms. Her brother (this time a brother by adoption) placed himself before her, and asked her with a soft voice if she was determined to die, and when she gave a sign of assent with her head, he asked her forgiveness for being obliged to kill her. At once he seized his kris and stabbed her on the left side of the breast, but not very deeply, so that she remained standing. He then threw his kris down and ran off. A man of consideration approached her, and buried his kris to the hilt in the breast of the unfortunate woman, who sunk down at once without a cry. The women placed her on a mat, and sought, by rolling and pressure, to cause the blood to flow as quickly as possible. The victim being not yet dead, she was stabbed again with a kris between the shoulders. They then laid her on the second platform near her husband. The same ceremonies that had taken place for him now began for the wife. When all was ended, both bodies were covered with resin and cosmetic stuffs, enveloped in white linen, and placed in the small side house on the platforms. There they remain until the time arrives for their being burned together.

It is always a near relation who gives the first wound with the kris, but never father or son. Sometimes dreadful spectacles occur; such was one at which Mr. K. was present. The woman had received eight kris stabs, and was yet quite sensible. At last she screamed out, impelled by the dreadful pain, "Cruel wretches, are you not able to give me a stab that will kill

me?" A gusti who stood behind her, on this pierced her through and through with his kris.

The native spectators, whom I had around me, saw in this slaughter which took place before our eyes, nothing shocking. They laughed and talked as if it was nothing. The man who had given the three last stabs wiped his kris, and restored it to its place, in as cold blooded a manner as a butcher would have done after slaughtering an animal.

Only the wives of the more considerable personages of the land allow themselves to be burned, because this is attended with much more expence than krising. They then make a very high platform of bambu. The woman ascends after many ceremonies, and when the fire is at its greatest heat. She then springs from above into the middle of the flames. Mr. K. thinks that they do not suffer much because during the leap they are stifled; and at all events the fire, strengthened by fragrant resins, is so fierce that death must speedily ensue.

The Balinese dress on Lombok in the same manner as on Bali, and the Sassaks nearly in the same way. For example, although Mahomedans, they have uncovered heads. The Sassak women differ a little in their dress from the Balinese. In the first place they do not bind up their hair with a piece of white cloth, like the Balinese, but go bareheaded like the men. Some wear a short *baju* like the women of Sambawa and Makassar, others have the bosom naked, or covered with a *slendang* of a coarse stuff, striped red and black in the length. The *sarung* is almost always of blue or black cloth.

The food of the people of Lombok differs in nothing from that of the people of Java. The Balinese, who may not eat beef, substitute for it pork. Both races eat buffalo flesh, goat's flesh, fish and poultry.

The people of Lombok are neither more nor less superstitious, than all the other people of the Archipelago. It is the Rinjani especially which makes an impression on the people, on account of the bad spirits which reside upon it. My travelling companions for example, he adds, told me not to shout upon the mountain because the bad spirits would become irritated, and not to take any stones from the ground, because they would resent it and play us some bad trick. Whoever wishes to approach the Segara Anak must be blessed, fasting, and have said his prayers and be clothed in white. As they approach it they must notice what appearance it presents to them. The more lengthened it appears to them, the longer time will they live. If it looms broad, they will quickly die. All these ideas are found however over all the Archipelago, round the great volcanoes, and in spite of all modifications which they have undergone, through time or local circumstances, they are all

based upon the belief of a supernatural and malevolent power which causes and regulates, the working of the subterranean fire. No religion, not even the Christian, will root out these fixed ideas from this people. Impressive phenomena, like volcanic, sound louder than all reasonings in the ears of uncivilized and timid men.—*Journ. Ind. Arch. No. IX. Vol. V. p. 537.*

(482) BURRA WAFAT. In the ritual of the Mahomedans, the death of Mahomed occurred on the twelfth day of the third month Rubbre-ool-awuk. Herk.

(483) BUSSUNT, HIND. Spring, a festival observed at Lucknow.

(484) BUTASHA, SUGAR CAKES.

Matasha, HIND.

(485) BUTEA FRONDOSA.

Palas, SANS.

Palas, BENG.

Moodooga, TEL.

Plasa, RHEED.

Not very common on the low land of the coast, but much more so among the mountains and still more in Bengah. Leaves deciduous, during the cold season, they come out again with the flowers, about the months of March and April, seed ripe in June and July.

From natural fissures, and, from wounds made in the bark during the hot season, there issues a most beautiful red juice which soon hardens into a ruby coloured, brittle astringent gum, but it soon loses its beautiful colour if exposed to the air. The dried flowers are called "*Tesoo*."

Infusions of the flowers either fresh or dried dye cotton cloth previously impregnated with a solution of alum, or alum and tartar, of a most beautiful bright yellow which is more or less deep according to the strength of the infusion. A little alkali added to the infusion, changes it to a deep reddish orange. It then dyes unprepared cotton cloth of the same colour, which the least acid changes to a yellow or lemon. These beautiful colours Mr. Rohde had not been able to render perfectly permanent. The lac insects are frequently found on the small branches and on the petioles of the leaves of this tree. The natives are not known to make any use of the gum or flowers, although they promise to be valuable. The former is a medicine, and the latter as a pigment, and dyeing drug.—*Rohde, M.S.S.*

(486) BUTTER MILK.

Moroo, TAM.

Salla, also Majiga, TEL.

Buttermilk forms an ingredient in many native recipes, it is used by Chucklers for softening leather.—*Rohde, M.S.S.*

(487) BUYO, in Tagala, Sweet Potatoes.



## CALOTES.

### (488) CAESALPINIA SAPPAN.

Teng-yet, or Ten-yet, BURM.

This grows abundantly in the province of Mergui, and adjacent parts of Siam, in several parts of the Shyān territory, and among the mountainous regions of Manipore. The full grown tree is seldom higher than from fourteen to sixteen feet; thorny, bearing a large yellow flower in the month of August; leaves, small and of a dark green. It belongs to the same order of plants with *Brazil wood*.—*Malcolm's Travels*.

(489) CAESALPINIA SEPIARIA is much used in the Bombay Deccan as a fence. Hyder Ali surrounded fortified places with it.—*Chow-Chow*, p. 300.

(490) CAJEPUT is a corruption of the Malay words kaya-putih, literally "white wood" from the colour of the bark of the tree and which produces the well-known essential oil, the *Melaleuca cajeput* of botanists. It most abounds in the island of Borneo in the Molucca Sea, where the essential oil is obtained by the distillation of the leaves.—*Crowford Dicty.* page 79.

(491) CAJO MARM, is the Malayala name for the Cashew-nut tree. This tree grows to about ten inches diameter, and covers a large surface. It is considered the best sort of wood for charcoal, and is felled for this purpose only. With this as a substitute for coals, the assistance of a sheep-skin for bellows, and a hole in the ground for a forge, the native smiths produce any piece of iron-work that may be required for ship-work; iron knees and channel-work for large vessels; and the brass foundry, any piece of metal, such as the pintles and braces for ships of 700 tons burden.—*Edge M. and C.*

(492) CALLICARPA LANATA (Roxb.) bitterish, and rather aromatic.—*O' Sh.* p. 486.

(493) CALAMUS AROMATICUS. ANDROPOGON CALAMUS AROMATICUS. The sweet flag is used in Chinese medicine to a great extent for its spicy warmth.—*William's Middle Kingdom*, p. 278.

(494) CALOTES. T. C. Jerdon, Esq. sent from Saugur, a bottle of reptiles comprising one remarkable new species, which may be described as a Calotes, with enormous head, short and thick body, the tail not exceeding the body in length, and the toes also short and strong; a slight nuchal crest, and medial dorsal ridge composed of a row of high keeled scales; two detached tufts of sincipital spines, one contiguous to the tympanum, and each comprising one principal spine. Colour olive with a row of large round dark spots, bordered and set off with white

## CANARIUM COMMUNE.

along the back and anterior half of the tail, then continued as simple indistinct dark spots to the end of the tail, the white broader and forming a kind of pale spot on each side of the neck; and anterior to this first large spot is a smaller one upon the crest: lower parts yellowish-white, the throat regularly speckled with pale dusky: a conspicuous oblique white band passing from beneath the eye to the angle of the mouth, scales of the body in transverse bands, the oblique tendency much less conspicuous than in Calotes.—*Jour. of the Asia. Soc. of Beng.* No. ii. 1856, page 448.

### (495) CALOPHILLUM INOPHILLUM.

Ponna maram, RHEED.	Alexandrian laurel,
Ponna, TEL.	ENG.
Saltaha Champa, HIND.	

This most elegant tree is to be found in a cultivated state over most parts of India and indigenous near the shores of the southern parts. It is in flower and fruit most part of the year and is particularly beautiful. The wood is believed to be used for knees of ships.—*Rohde, M.S.E.*

(496) CAMELS. An instance of great endurance of the Camel is mentioned by Captain Smith, who purchased one, named Tippoo Sahib, for three hundred Rupees, that carried him six hundred and eighty miles in 12 days across the desert of India from Joudpore to Sukkur in Sind. On another occasion the same camel carried him 110 miles from Sukkur to Kotree without a halt, in thirty hours.—*Smith's 5 years at Nepal*, p. 20 and 26.

(497) CANARIUM. Under the head of "*Canarium*," Wight observes.—The resinous juice of the *Canarium commune* has properties similar to Copaiva, while on the other hand the kernels of the seed afford by expression a bland edible oil. The *Canarium strictum* of Roxburgh is known in Malabar under the name of the "black dammer tree" in contradistinction to the *Vateria* which is the "white dammer tree." This tree is rather common in the Alpine forests about Courtallum in the Tinnevely district, and is there regularly rented for the sake of its dammer. The dammer is transparent and of a deep brownish yellow or amber color when held between the eye and the light but when adhering to the tree has a bright shining black appearance. The flowers of the species had not been seen, the fruit is a very hard three celled oval nut tapering at each end.—*Wight Ill.*

(498) CANARIUM COMMUNE. (Roxb. *Fl. Ind. Vol. iii. p. 137.*) A native of the continent of India, the Archipelago and Isle of

## CANIS.

France, where it is called "Bois de Coloquane." It was brought from the Moluccas to the Calcutta Botanic garden, but in Roxburgh's time did not thrive, owing to the coldness of the winter months. The bark yields an abundance of limpid oil with a pungent turpentine smell, congealing into a buttery camphoraceous mass.

(499) CANAVALIA, with long straightish compressed pods, having three short wings at the lower suture, cellular dissepiments, and oblong seeds with a narrow hilum, comprehends the South American Lima Beans and the Sword Beans of India. The species have a handsomer and firmer foliage than the other genera, and the flowers are usually large and showy.

(500) CANAVALIA GLADIATA, the common cultivated species, has often pods two feet long, and varies with red, gray, and white seeds.

(501) CANAVALIA OBTUSIFOLIA D. C.

Koyli avaree, TAM.

Common on the sea-shore, frequently entwined with the last named binder, is also a very useful plant, and is very abundant at the Pdyar, Ennore, the mouth of the Godavery, and between Quilon and Anjengo.—*Cleghorn*.

(502) CANDLE-TREE. The nuts of the candle-nut tree (*Aleurites triloba*) are strung together and used for candles. Species of torches are also made from the candle wood in Demerara.

(503) CANDLES may be appropriately mentioned here, though the mode of making them is probably not Indian, but taught by Europeans. The natives use oil lamps, of various shapes, often of metal fixed on an iron spike, which they stick into the ground. But candles are now made in India; as, for instance, the wax candles from Patna, and the stearic candles of the Messrs. Sainte from Calcutta.—*Royle Arts &c. of India*, page 484.

(504) CANDY, A measure of weight equal to 500 lbs.

(505) CANJARA, the Tamil and Malayala name of a tree which grows to about two feet and a half in diameter, and from twenty-five to thirty high of little use or durability. The natives value its fruit, which is very intoxicating, and used by them as a medicine.—*Edge. M and C*.

(506) CANIS. Arthur Grote, Esq. B. C. S. lately sent the skins and skeletons of a mature female and male  $\frac{1}{3}$  grown of the ordinary Wild Dog (so called) of this country from Chaibasa in Central India. These animals were specifically identical with a particularly fine living adult male in Mr. Bligh's own possession sent down from Upper Assam, and this appears to be the ordinary species alike of the Himalaya and of Central and S. India *Canis Dukhunensis* Sykes and *C. primævus* Hodgson, and a Malayan specimen in the Calcutta Museum which he takes to be *C. sumatrensis*. Hardwicke would appear to differ only in the considerably deeper tint of its

## CARYOTA URENS.

rufous colouring.—*Journal of the Asiatic Society of Bengal*, p. 440.

(507) CAPPARIS TRIFOLIATA. THREE-LEAVED CAPER: CRATÆVA ROXBURGHII. The three-leaved caper tree produces large handsome terminal heads of flowers with numerous purple stamens and white clawed petals that change to cream color.

(508) CARABUS CŒLESTIS. Not the least striking of the beetles obtained in China was this beautiful species of Carabus.—*A Res. among the Chi*. p. 62.

(509) CARAWAY, Black. Zeera seeah. Fruits of Carum Nigrum, a good substitute for Carum Carui, the seed of the Somraj (*Conyza anthelmintica*), are often sold for it in the bazar; about  $\frac{1}{8}$  of an inch long, slightly winged, flat, ovato-lanceolate, ribbed on one surface.

(510) CARBUNCLE.

Manikiam, TEL. and TAM.—*Rhode, M.S.S.*

(511) CARDAMOMS. Yalakki (Can) Cardamom (Eng) Cardamoms are extensively grown in the woods north of Nuggur; and are exported to all parts of Southern India.—*M. E. J. R.*

Cardamoms are known in the Malay and Javanese languages by two names, kapulaga and puwar, which have every appearance of being native words, and yet the plant is neither indigenous nor cultivated in the Indian islands. It is the exclusive product of three countries only, Malabar, Ceylon, and Kamboja, and in these the spontaneous product of the forest incapable of cultivation. An immemorial commercial intercourse has existed between these and the Malayan countries.—*Crawford Dictionary*, page 83.

(512) CARBONATE OF SODA. Impure Carbonate of Soda; Dhobies earth?

(513) CAREYA ARBOREA. Koomblee is the name of its fibre employed in the Himalayas as slow match for the matchlocks.

(514) CARYOTA URENS. Lin. BEAD-SEED KOONDEL PANEL.

*The Seed.*

Koondel Panai Munnie, TAM.

The dark coloured, oval seeds of the Caryota urens are used by the Mahomedans as beads. The tree is called Erimpanna in Canarese.—*Ainslie's Mat. Med.* p. 142.

*The Tree.*

Kamboo kara, TEL.	Pooti tanni maram, TAM.
Pelon, RHEED.	Erimpanna, CAN.

A tree of immense size growing on the mountains of Coromandel &c. where it blossoms during the hot season, the seed ripens about three or four months after.

The wood is used for furniture and for many purposes where it is not exposed to the weather. It is light and of light yellow colour; it is very liable to twist and warp, another timber Bandaroo



# CASSIA LIGNEA.

is confounded with this in name on the Godavery.—*Rohde, M.S.S.*

(515) CARROO MARRATHIOO. *Terminalia elata*, used for the same purposes as Ben Teak under which name it is frequently sold. Common on the Western Ghats and in Wynaad, the wood is not durable.—*Hg. McIner, M. E.*

(516) CARISSA CARANDAS: its berries make good tarts, and the plant itself forms tolerable hedges.—*Hooker Him Jour., page 13.*

(517) CARPETS. The Indian carpets most commonly met with are of cotton, in blue, red, and white; and although durable, possessing no other good quality. Some few made of cotton and silk for great potentates are extremely beautiful.

# (518) CARYOTA URENS.

Teerooga, TEL. | Schundapana, RHEED.

A native of the various mountainous parts of India, where it grows to be one of the largest and most charming of this beautiful tribe or natural order. Flowering time the hot and rainy seasons. This tree is highly valuable to the natives of the countries where it grows plentifully. It yields to them during the hot season an immense quantity of toddy or palm wine. The best trees it is said will yield at the rate of one hundred pints in the twenty-four hours. The pitti or farinaceous part of the trunk of old trees is said to be equal to the best sago, the natives make it into bread, and boil it into thick gruel, these form a great part of the diet of the people and during a late famine in India they suffered little while these trees lasted. This substance is highly nutritious. The gruel is fully as palatable as that made of sago from the Malay countries *Roxb.--Rohde, M.S.S.*

# (519) CASSIA FISTULA. LEGUMINOSÆ.

Koannay marum, TAM.

The fruit.

Konnaykai, TAM.	Dranguli, JAV.
Amultas, DUK. & HIND.	Suvernaca, SANS.
Buckbur, ARAB.	Cacay, CAN.
Khyar chembee, PERS.	

The Native practitioners of India, consider this to be a valuable laxative; and prescribe it in the form of electuary in cases of habitual costiveness; the flower of the plant is also employed in decoction for wind and pain in the stomach.—*Ainslie's Materia Med. p. 8.*

# (520) CASSIA LIGNEA.

Lawunga puttay, TAM.	Twacha, SANS.
Darchinie, DUK.	Cayoomanis, MALAY.
Tej, HIND.	Laurus cassia, LIN.
Seleekheh, ARAB.	

This is a favorite medicine of the Mahomedan, as well as the Tamool practitioners, who consider it as a grateful and useful stomachic. Great part of that used in India comes from the coast of Borneo, or from Ceylon, where it is called

# CASUARINA MURICATA.

Dawul Curundu. It is however, a natural product of India, and is found growing in abundance in the woods of Canara and Malabar, in which first mentioned country it has got the name of Ticay. Its Hindoostanee appellation is Tejpat, in Sanscrit it is Tamala patra.—*Ainslie's Materia Med. p. 8.*

(521) CASSOWARY. *Casuarus* or *Bennettii* of Gould. *New species.* Moorook, in the language of New Britain. Dr. Bennet, in a letter dated Sydney 10th Sept. 1857, says, a new species of Cassuary was recently brought to Sydney, procured from the natives of New Britain an island near to new Guinea. The height of the bird is three feet to the top of the back, and five feet when standing erect. Its colour is rufous, mixed with black on the back and hinder portions of the body, and raven black about the neck and breast. The loose wavy skin of the neck is beautifully colored with iridescent tints of blueish purple, pink and an occasional shady green, quite different from the red and purple caruncles of the *Casuarus galeatus*. The feet and legs which are very large and strong are of a pale ash colour. This bird also differs from the *C. galeatus* in having a horny plate, instead of a helmet like protuberance on the top of the head: which callous plate has the character of and resembles mother of pearl darkened with black-lead. The form of the bill differs considerably from that of the Emu *Dromaius Novæ Hollandiæ* being narrower, larger, and more curved, and in having a black or leathery case at the base. Behind the plate of the head is a small tuft of black hair like feathers, which are continued in greater or lesser abundance over most parts of the neck. The egg is about the same size as that of the Emu, and is of a dirty pale yellowish green colour. The bird appears to Dr. Bennet, to approximate more nearly to the Emu than to the Cassowary, and to form the link between these species. In its bearing and style of walking it resembles the former, throwing the head forward, and only becoming perfectly erect when running; It also very much resembles the *Apteryx* in its body, in the style of the motion and in its attitudes. Its bill presents a great deal the character of that of a rail: it utters a peculiar, chirping whistling sound, but also a loud one resembling that of the word "Mooruk," whence, no doubt, it derived its native name.

Of the particular section of the *Struthionidæ* there are now three species, *C. galeatus*, a native of N. Guinea; *C. Australia* inhabiting the Cape York district of Australis: and *C. Bennettii*, whose domicile is New Britain—*London Athenæum, No. 1512, December 12, 1857. p. 1551.*

# (522) CASUARINA MURICATA.

Surva Chettoo, TEL.

This is said to be a native of the sand hills on

the sea side in the province of Chittagong and from thence was sent by Dr. Buchanan to the Botanic garden of Calcutta, where in the course of 10 years from the seed, they grew to be trees of from sixty to eighty feet in height with trunks three feet and a half in circumference, four feet above ground, but in their native soil, the large trees are said to be nearly one hundred feet high and nine or ten feet in circumference. The wood is not held in estimation though of a reddish colour, and texture like *Cedrela Toona*. In the Botanic garden they blossomed during the months of February and March.—*Rox.*

The cones must be collected before they burst, and by placing them in a pot in a dry and warm place, the seed will be found shed from them in a few days: it should be sown immediately.—*Rohde, M. S. S.*

### (523) CATGUT, CATLING.

*Rhoda, Guz. Hind.*

A kind of rope somewhat resembling Catgut is made by the chucklers of the sinews of animals, it answers tolerably for lathe bands, drill bow strings &c. As there is good reason to believe that Catgut of superior quality might be prepared in this country, and the process is simple, Mr. Rohde gives the description of the manufacture.

The guts being taken while warm out of the body of the animal are to be cleared of feculent matter, freed from any adhering fat and washed in a tub of water. The small ends of all the intestines are next to be tied together and laid on the edge of the tub, while the body of them is left to steep in some water, frequently changed, during two days, in order to loosen the peritoneal and mucous membranes. The bundle of intestine is then laid upon a sloping table, which everhangs the tub and their surface is scraped with the back of a knife, to try if the external membrane will come away freely in breadths of about half the circumference. This substance is called by the French Manufacturers *filandre*, and the process *fibre*. If we attempt to remove it by beginning at the large end of the intestine we shall not succeed. This *filandre* is employed as thread to sew intestines and to make the cords of rackets and bottledores. The flayed guts are put again into fresh water, and after steeping a night, are taken out and scraped clean next day, on the wooden bench with the roundest back of a knife.

This is called curing the gut. The large ends are now cut off, and sold to the pork butchers. The intestines are again steeped for a night in fresh water, and the following day in an alkaline lixivium made by adding 4 ounces of potash and as much pearlsh, to a pail of water containing about 3 or 4 imperial gallons. The lye is poured in successive quantities upon the intestines, and poured off again after 2 or 3 hours, till they be purified. They are now drawn several times

through an open brass thimble, and pressed again it with the nail, in order to smooth and equalize their surface. They are lastly sorted according to their sizes to suit different purposes. Whip-cord is made from the above intestines, which are sewed together endwise by the *filandre*, each junction being cut a slant so as to make it strong and smooth. The cord is put into the frame, and each end is twisted separately, for whip-cord is seldom made out of two guts twisted together. When twisted it is to be sulphured once or twice. It may also be dyed black with common ink, pink with red ink which the sulphurous acid changes to pink, and given with a green dye which the colour dealers sell for the purpose. The guts take the dyes readily after being well smoothed, the cord is to be dried and coiled up for sale.

*Hatters cords for bow strings.*—The longest and largest intestines of sheep, after being properly treated with the potash are to be twisted 4, 6, 8, 10 or 12 together according to the intended size of the cord, which is usually made from 15 to 25 feet long. This cord must be free from seams and knots when half dry, it must be exposed twice to the fumes of burning sulphur and after each operation, it is to be well stretched and smoothed; it should be finally dried in a state of tension.

*Clock makers Cord*—This cord should be extremely thin, and be therefore made of very small intestines, or from intestines slit up in their length by a knife fitted for the purpose being a kind of lancet surmounted with a ball of lead or wood. The wet gut is strained over the ball which guides the knife, and the two sections fall down into a vessel placed beneath. Each hand pulls a section. Clock makers also make use of stronger cords made of 2 or more guts twisted together.

*Fiddle and harp strings*—These require the greatest care and dexterity on the part of the workmen—The treble strings are peculiarly difficult to make, and are best made at Naples, probably because their sheep, from their small size and leanness, afford the best raw material.

The first scraping of the guts intended for fiddle strings must be very carefully performed and the alkaline lyes being clarified with a little alum, are added in progressively stronger state from day to day, during 4 or 5 days, till the guts be well bleached and swollen. They must then be passed through the thimble and again cleansed with the lixivium, after which they are washed; spun, or twisted and sulphured during two hours. They are finally polished by friction and dried: sometimes they are sulphured twice or thrice before being dried and are polished between horse hair cords.

It is well known to physiologists that the membranes of lean animals are far more tough than of those animals which are fat or in



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high condition, and there is no reason to doubt that the superiority of the Italian strings arises from the state of the sheep in that country.

For preserving lathe bands the juice of garlic is a good application.—*Rohde, M.S.S.*

### (524) CATECHU.

Kachu, MALAY; Shah, BURM.

The *Acacia* or *Mimos* Catechu, is indigenous, in Burmah rising sometimes to a height of forty feet. Timber, tough and durable, much used for ploughs, and from this tree is made the catechu, cutch, or terr japonica, chewed generally with the betel-nut. The wood is hewed into chips, boiled and the liquor inspissated till it becomes thick enough to spread on a mat, when the drying is completed in the sun. It dissolves completely in water, is slightly bitter, highly astringent, and contains fifty-five parts in a hundred of tannin. Burmans make two kinds, the red and the black; both from the same tree. The red is preferred in Bengal, and the black in China. It is chiefly made in the neighbourhood of Prome, though the tree is found in all parts of the country.—*Malcolm's Travels in South Eastern Asia, Vol. 1. p. 187.*

A similar article is produced in Malaya, from the plant called *Uncaria gambier* and in Egypt and Arabia from the *Acacia*. It has lately been exported from Singapore to England in large quantities, for tanning.

### (525) CAZEE, a Mahomedan Judge.

### (526) CELASTRUS MONTANA.

Peddo, TEL.

A small tree, a native of the Circar mountains. The wood of this tree is hard and durable.—*Rox.*  
—*Rohde, M.S.S.*

### (527) CELASTRUS PANICULATA.

*The oil.*

Malkungunee or staff Tree oil—*Celastrus paniculata*. Oleum Nigrum—*Valulavy tylum*.

Valulavy yennai, TAM. | Malkungunee ka tael HD.  
Bavungie noona, TEL. | Vaylarie tylum, TAM.

An empyreumatic oil obtained by the destructive distillation of the seeds of the *Celastrus*, either alone or in combination with other ingredients. It was much used in the treatment of Beri-beri, *Macolmson's Essay, p. 312.—M.E. J.R.*

(528) CELEBES. The tongue of land in the north of Celebes, known administratively under the name of the residency of Menado, comprehends all the northern extent of the island, from the bay of Palos in the west, to the cape of Taliabo in the east, and comprises the great bay or arm of the sea of Gunong-tello, which stretches in a westerly direction between the two peninsulas. The residency of Menado includes under its jurisdiction, the whole federative states of

## CELEBES.

Minahassa; the small kingdoms of the northern coast; the very extensive districts in the west part of the peninsula, where government exercise sway, besides the islands of Sangir and Talau to the north, as well as the lesser islands of the west coast and the large gulf of Tomini.

The population is composed of Native Christians, Malays and Chinese. In 1440 there were reckoned in Minahassa:—

Natives.	-	-	73,700
Christians.	-	-	5,687
Malays.	-	-	2,875
Chinese.	-	-	510
Freed Slaves.	-	-	500

----- 88,272

The districts of Gorontalo. - 50,000

Sangir and Talaut islands. - 40,000

-----  
Total...178,272

Without taking into account the number of the Alfouira population of the interior, which cannot be very considerable, seeing that the elevated and woody parts of Kayeli, Toradja and Tomeiku appear to be thinly peopled.

The Minahassa confederation counts 286 villages; the principal districts are Tondano, Langgong, Kakes, Temehon, Sonder, Kawakkoang, Tompasse, Amurang, Belang and Kema. They are all under the direct authority of Government; the resident and three other European civil employes, assisted by an indeterminate number of native functionaries, administer the government. The resident is under the orders of the governor of the Moluccas, the head quarters of which is Amboyna.

Sangir and the numerous islands of this group occupy a superficies of 13 square leagues, the Tolaut and the Meangis islands united are 18 square leagues; these archipelagoes, formerly subject to the authority of the Sultans of Ternate, now make part of the residency of Menado.

Several extinct volcanoes, and some still in full action, are found in the Sangir group; the devastations which they commit from time to time, have often been fatal to the inhabitants. The eruption of Dawana, in 1808, completely annihilated the village of Tagalando, destroyed all the surrounding forests, and suddenly deprived the inhabitants of all means of livelihood, by the destruction of their fields. The Gunong-api causes numerous ravages in the island of Sjauw; its peak, 6000 feet above the level of the sea, forms the culminating point of this group. Gunong abu covers with its base all the northern part of Sangir-besar, this volcano has not been acted since 1812 when the torrents of lava destroyed the extensive forests of coconut trees with which this part of the island was covered, and caused the death of many of the inhabitants. These islands furnish more than twenty-five kinds of wood suited for building and furniture. Two har-

## GERAMIC MANUFACTURES.

bours, sheltered from all winds, exist in the larger Sangir; one in the Bay of Taruna, the other, called Midelu, on the eastern side.—*Journ. Ind. Arch. for Dec. 1850, page 764.*

(529) **GERAMIC MANUFACTURES, CHINA PORCELAIN, EARTHENWARE, &c.** This art may still be said to be in its infancy in India as no great perfection has been attained in any branch.

*Earthenware or Common Pottery.*—There are three distinct branches of this manufacture which though similar in their manipulation are different in their results. The most common kind is the red porous earthenware used for chatties and cooking vessels, the black used for similar purposes and the fine white which resembles some of the biscuit earthenware of Europe.

The red porous earthenware differs very materially in quality according to the locality from which the clay is selected—some are made of a common coarse earthy loam which has very little tenacity, and yields a brittle kind of pottery neither susceptible of much finish nor of being glazed. Most of the Pottery of India is of this description, it is made on a curious principle which is unknown in other countries but which has probably been followed for many centuries in India. The vessels which are mostly of a round form are thrown thick in the neck and upper parts or sides. They are cut off the wheel and left open in the bottom with vertical sides, they are then allowed to harden a little in the necks and as soon as they will bear to be handled the sides are thinned out by beating with a flat mallet upon a rounded stone or very hard round piece of wood held inside the vessel which is turned about and beaten till it is closed. This is a very tedious and unsatisfactory mode of working and the only recommendation is, that it makes a thin-walled vessel but at a great sacrifice of time; from 10 to 20 of these is a good day's work, while a skilful European thrower will turn out 500 in the same time. Good samples of this quality of earthenware were exhibited from Travancore, at the Madras Exhibition, they are made from a fine smooth Micaceous loam and the general forms are good though heavy. A finer description of this ware was exhibited from Hyderabad, made from a tough smooth plastic clay and the articles were remarkable for elegance of form and extreme lightness of throwing. Some of the vessels had been ornamented with gold leaf and coloured lac varnishes; others had been made in imitation of Bederie ware, some were painted white on a red ground; a few appeared to have been glazed and coloured with a soft lead glaze—On the whole this collection exhibited a marked improvement on the ordinary manufactures of this class; tasteful forms and light throwing being combined and a good effect having been produced with simple means.

## GERAMIC MANUFACTURES.

The following Remarks by Captain Ivie Campbell, Offg. Deputy Commissioner, E. Du. R. Doab, Raichore, 28th August, 1855, upon the Pottery from Raichore sent to the Madras Exhibition, will be read with interest. "There is but one family in Raichore which can make this description of pottery, they are christians long established here and the party to whom the amount of prize has been paid was by Rajah Chundu Lall presented (probably on account of his skill) with a small ruined hamlet in Mukta, and which has been continued to him by order of the Resident. A brother of his resides at the Beebee Chushma at the city, but the same quality of clay is not procurable there, and his work is stated to be inferior; much of what he sells in the city, gilt chillums &c., he receives from his brother here.

How far his account of the composition of the glaze used can be depended on I cannot say, he states that no lac is used except in fixing the gold leaf, the following is the account given by him.

24 parts Moordar Sing or Litharge.

3 do. Gar ke Puttur, a stone resembling white quartz common here.

1 part Copper.

Sendoor or the red oxide of lead may be substituted for the Litharge.

The Gar ke puttur, should be well burnt, slaked in cold water and afterwards reduced to a fine powder and mixed with the Litharge. The copper is mixed with its weight of finely powdered sulphur and heated in a crucible till a green scale has formed on it, it is then finely powdered and mixed with the Gar ke puttur and Litharge. The whole is again heated and reduced to a fine powder once more.

A small quantity of this powder is well mixed with wheat starch and kneaded well for some time, water is then added and it is strained through a fine cloth, and the glaze is gently rubbed in with the hand, after which the pottery is baked."

This process of glazing pottery is very similar to that practised in Italy, Germany and some parts of England where paving tiles, green flower pots and common red Earthenware, are manufactured. The Gar ke puttur is probably either white Felspar or Pegmatite a variety of granite very abundant in Southern India and composed of 3 parts Felspar and about 1 part of quartz. The clay which is employed is probably more refractory than the common red clays of India, most of which begin to lose their shape or to become spongy at the temperature for melting such glazes. The above details are of considerable interest as they prove that the art of pottery is improving in Southern India.

*Antique pottery*—The finest specimens of common earthenware are the ancient funereal, dome,



tic and cooking vessels, dug out of the old Tombs in the districts of Coimbatore and South Arcot. This kind of pottery has been found in many parts of India in tombs usually arranged in circles, each tomb being built of 6 slabs of stone and occasionally surmounted by large mounds of loose stones and earth. They have been thought to resemble the Druidical tombs of England, and are supposed to be of great antiquity, there being no records of them extant.

The pottery usually consists of tall narrow cinerary urns of 18 or 20 inches in length, with three or four clumsy feet, 4 inches in length, and of a variety of round oval and flattened vessels of different shapes and sizes, some having apparently been used for cooking and others as drinking vessels. The tall urns usually contain burnt human bones, teeth and ornament of brass, or copper, they are made of a coarse clay, and have not been finished with care, some of the flattened oval and rounded vessels are made of a fine dense clay that has been carefully prepared, the surfaces are variously ornamented with wavy or crossed lines of red and yellow carefully painted. The pottery appears also to have been smeared (it resembles the potteric antique vernissee et lustree figured by M. Brongniart.) There is great purity of form in most of the vessels which resemble the Etruscan in the precision of the curves and in the angles at which the different surfaces meet. The art of pottery appears to have deteriorated in India, since these samples were made and one branch of it is apparently lost viz., the smearing or thin glazing on the surface.

**Black Earthenware.**—This is a mere variety of the Red and in most instances it is the same kind of Pottery blackened by the simple process of damping or checking the fire when it is beginning to decline, and thus throwing a great deal of smoke amongst the wares when the heat is not sufficiently intense to burn it off. A better and stronger kind of black Earthenware is manufactured at Bangalore from a fine dense clay that contains both manganese and iron. This approaches the black stoneware of Egypt, and is strong and sonorous when struck; some good samples were also exhibited in the collection of colored Terra Cottas from the Madras School of Arts.

**White Earthenware.**—Some light and elegant samples of goglets, butter pots and vases, were exhibited by the Arcot Local Committee. These were considered deserving of a 2d Class Medal. This branch of the Art differs from the others in being conducted with more care and cleanliness, some attention being paid to the sifting of the materials and to the ornamenting and finishing of the articles. The material selected is a decaying white granite resembling the cornish stone of England or the graun of Germany.

This is carefully washed, and decanted to free it from sand or impurities; it is then allowed to subside, the water is poured off and the soft clay is collected on a clean cloth and laid on a heap of white wood ashes to dry; a small percentage of alkali is thus absorbed through the cloth and is incorporated through the mass by kneading. This clay or decayed white granite is the true kaolin or Porcelain earth of China and Europe. It is particularly abundant in India and occurs in beds of enormous extent and of every variety of color. It possesses the valuable qualities of combining with a large percentage of Silica, Felspar, Baryta or other stony bodies and of resisting the most intense heats, but in India it is employed alone and produces a soft brittle porous ware which is not susceptible of being well glazed. Numerous attempts have been made to glaze this description of Pottery but the glaze crazes or cracks all over the surface and allows water to penetrate to the body. The reason is that the koalins require flint, felspar, or stone to open them, and exposure to a long continued and steady heat before they are thoroughly burnt in the biscuit state. They also require a hard fritt or porcelain glaze, which cannot be prepared without expensive machinery, the firing also involves a great consumption of fuel as the heat must be kept up steadily for 40 or 60 hours. —M. E. J. R.

(530) CERAM LAUT ISLES. A cluster of islets lying off the south eastern extremity of the large island of Seran, or Ceram in lat.  $3^{\circ} 55' S.$  and  $133^{\circ} E.$  They produce tortoise shell, mother o pearl shell, beche de mer, wild cinnamon, wild nutmegs, and birds of paradise. —*Jour. Ind. Arch.* p. 690.

(531) CERVUS. At the Paris Exposition of 1855 of the Cervidæ, there were exhibited the following :

*Cervus Muntjac.* Kadang Kijang Malay.

*Cervus Kuhlii.*

*Cervus Moluccenses.*

*Cervus babrussa.* Rusa, Malay.

*Cervus axis.* Spotted Deer.

*Cervus equinus,* inhabits Borneo.

*Moschus Memina.* Naper Malay and Javanese.

*Moschus Javanicus* Kauchil Malay.

*Moschus Kauchil* Palandok Malay.

*Antilope depressicornis.*

*Cervus Duvancellii,* bara singha ;

*C. Aristotelis,* Ek ;

*C. Hippelaphus,* Sambur.

*C. Vaginalis,* Kaher or barking deer ; muntjac.

*C. porcinus,* jungle sheep or hog-deer.

*Rapports du Jury mixte international,* p. 54.

(532) CEYLON. The following notes upon the Vegetable Productions of the island of Ceylon were thrown together in the Journal Royal Asiat. Society 1856, part 2, Vol. XVI. Art. XIV, as a brief notice of the Vegetable Produc-

(ions of Ceylon, by John Capper. M. R. A. S. tread March 6th, 1852) in the hope that, without entering upon minute or technical details he might give a concise and simple detail of the growth, locality and value of each article of production.

These articles are as follows: coffee, cinnamon, coir, sugar, rice, tobacco, cotton, areca nuts, cocoanuts, cardamoms, pepper, arrowroot, maize, manioc, fine grains, arrack, coconut oil, essential oils of cinnamon, citronella and lemon grass, dyewood, ebony, and other furniture woods. It is a fact worth noting that of the above only one article has been introduced into the island by Europeans during the 350 years they have been connected with it. The sugar-cane was brought to Ceylon from the Mauritius by a merchant of Colombo, about twenty years since. It may, perhaps, not be without use if the above products be classified under three heads: those which are chiefly exported to Europe: those which are shipped to the adjacent states of India as well as used on the island; and such as are only produced for local consumption. The first class comprises coffee, cinnamon, coir, sugar, cardamoms, dyewood, ebony, coconut oil, and essential oils. Of these the most important by far is

(533) *Coffee*. When Ceylon became a British possession it was considered as valuable only for its pearls and spice: at the present time the pearl fishery of the island has ceased to be productive, whilst the trade in cinnamon has sunk into an almost profitless speculation. Coffee is now the great staple of the island, and deservedly ranks first on account of the money value of the yearly exports, not less than the great number of persons, both Europeans and natives to whom it affords a regular employment. When the Portuguese first settled in the island, in the early part of the sixteenth century, coffee was found growing in many parts of the hilly districts of the interior though entirely uncultivated, and only known to the priests who reared it in their temple gardens, and prepared a medicinal beverage from the berry. The Portuguese settlers in the East paid far more attention to religious than to agricultural or commercial matters, and we accordingly hear nothing of coffee as an article of culture or trade, until late during the Dutch rule in Ceylon. Even at that period it seems to have been shipped to Holland rather as an object of curiosity, and up to the close of the Dutch administration of the island the entire yearly quantity said to have been grown throughout the country was 2,200 cwts. though one of the Dutch revenue officers, in his report to the government, gave it as his opinion that ten times that quantity, or 22,000 cwts. might possibly be produced annually. The yearly crops have of late amounted to 300,000

cwts. Although the British government obtained possession of the maritime provinces of Ceylon from the Dutch in the year 1796 the interior or Kandian province was not ceded to the crown until 1815 and, inasmuch as coffee will not grow to any extent in the maritime or low country, it follows that no improvement could take place in this culture until after the latter period, when the hill districts become tranquil and were gradually opened up by good roads. From 1820 to about 1830 the quantity of coffee shipped to England yearly increased, although it still consisted entirely of the native grown, badly prepared berry, reared without any attempt at cultivation, and ranking below almost every other kind of coffee. In 1830 the first attempt at coffee-cultivation and curing was made on a proper scale by the governor of the island, Sir Edward Barnes. The success which attended this experiment, although partial, added to the lowering of the import duty on British East India coffee by the imperial legislature in 1835, and induced several merchants and others to apply for waste forest land, for the cultivation of coffee on the West Indian principle. During 1836 and 1837 upwards of 7,000 acres of crown lands were purchased, and partly cleared and planted. The success of these first operations drew many capitalists to Ceylon for similar purposes and the land sales which in 1838 amounted to 10,000 acres grew to 78,000 acres in 1841. By the end of 1847 when fresh operations had ceased, about three millions sterling appear to have been invested in coffee planting in this island chiefly by Europeans. The number of plantations formed was 337, the majority of which contained from 120 to 300 acres of cultivated coffee. The total acres brought under this culture up to 1849, were 50,840; of which, however, several thousands had ceased to be productive. These estates are situated at a great variety of altitudes ranging from 1,000 to 4,500 feet above the sea level. As a rule, good coffee cannot be profitably grown in Ceylon at a less altitude than 2,500 feet the most favourable height being from 3,000 to 3,500 feet. The best plantations are situated in the Kandian province where the thermometer ranges at noon about 76, and in the morning not higher than 60. The principal drawback to the success of these properties has been the absence of roads in many directions, compelling the planter to convey his half dried crop on the heads of coolies, or on the backs of bullocks, for a distance of 25 to 35 miles, before finding any carriage transport. The dampness and coolness of the hill climate renders it impossible to perfectly cure the Coffee berry in those elevated regions; it has therefore to be conveyed to Colombo, where a constant high temperature enables the merchant to complete the drying process, which



the planter had but commenced. In this way, a crop of Coffee costs as much to transport it from the estate to the place of shipment, distant about 100 miles, as it will to convey it thence to England. The labour by which these properties are cultivated is almost entirely imported from the adjoining coast of India, a few Singalese occasionally assisting to gather the crops, when a high rate of pay is held out to them. The coffee thus grown under European superintendence, is known in this country as "Plantation" kind, whilst that which is still allowed to grow wild about the Singalese villages, gathered half ripe and rudely cured, is known as "Native" or ordinary Ceylon coffee. The quantities of the two sorts exported to Europe of late years have been as follows :

In 1848.....	Cwts	280,000
1849.....	„	328,000
1850.....	„	319,000
1851.....	„	273,000

of which above two-thirds were plantation coffee. The island consumption amounts to about 25,000 cwts. during low prices ; but when coffee becomes more in demand, the natives content themselves with using the black and damaged pieces picked out from the marketable berries. This circumstance will partly account for the shipments of 1848 and 1851, both years of lower prices than in 1849.

(534) *Cinnamon*. From the earliest period at which any record existed concerning the use of this spice, and which extends back to the days of the Roman republic, up to the year 1769, during the latter portion of the Dutch rule in Ceylon, cinnamon grew in a wild state, amongst the thick jungles of the low and hilly country, the best always having been cut upon the light soil of the maritime provinces. The Dutch governor Falek was the first who attempted to bring the wild plants into a cultivation, amidst much opposition from the native chiefs. His plan however, only extended to draining the land and freeing the bushes from weeds and low jungle, so as to admit the light and air around them. Nothing further appears to have been done until the island had been in our possession twenty years, when extensive improvements took place. Large tracts of cinnamon land were cleared and opened by the hoe, and after draining, the vacant spaces were filled up with young plants. The low country headmen were induced to co-operate by means of promotions and honorary rewards and by these means the government, into whose hands the culture and trade had always been vested, found itself in possession of five tracts of well planted cinnamon, varying in extent from 6,000 acres to 600 acres, the yearly produce of which rendered supplies from the wild bushes of the forests no longer necessary. This spice is to be found

only in the western, southern and central provinces, and there appears little doubt that it was the abundance of cinnamon growing on the west coast of the island, which induced the first Portuguese settlers to fix the seat of their government at Colombo a spot devoid of any harbour or shelter for shipping. In 1833 the trade in this article was thrown open to the public, and six years later the government commenced the sale of their preserved plantations by monthly auctions. In this way the whole of them with but one exception, have been disposed of chiefly to English merchants and capitalists. In some cases, the gardens, as these lands were called have been brought into a much higher state of cultivation than was previously the case ; but in frequent instances they are much neglected ; and upon the whole, the quality of the spice as now shipped, will not bear comparison with the produce of former years. The forests are still searched for the jungle cinnamon, by the natives, especially when there happens to be a little better demand for the spice ; but the quality of this sort is far below that of the cultivated bark, as much as three-fourths of it being generally devoid of any flavour or aroma. The cinnamon gardens afford employment to a considerable number of Singalese at most times of the year, both for cultivating the bushes, and for preparing the crops, which are taken off twice annually, during the rain attendant on the change of each monsoon. These croppings or peelings continue for about five months in each year and a great portion of the remaining seven months is required for putting the gardens in order. Amongst other recent improvements may be mentioned pruning and manuring the bushes ; these have in some instances, brought the produce of an acre of land from 50 lbs. to 350 lbs. of spice during the year, and this too upon considerable tracts. The operation of peeling, or removing the bark from the stick, is performed by one particular caste of natives called "Chalias," a low class of persons whose ancestors were originally appointed to the duty by the Singalese kings ; and who until lately enjoyed many privileges and exemptions from taxation, in consideration of their services. The trade in this spice has fallen away sensibly of late years, in spite of the efforts made to save it by liberal reductions of the export duty. During the early part of the Dutch rule in Ceylon their yearly shipments amounted to 10,000 bales, of 88 lbs. each, of which 2,000 were for India, Persia and Arabia. These latter places have long ceased to take any cinnamon, whilst the exports to Europe have been reduced to 7,000 bales of 100 lbs. in 1849, 6,000 bales in 1850, and 5,800 bales in 1851 although the selling price in the London market has been brought down to about one-third of that realized

twenty years since. In 1835 the export duty in Ceylon was 2s. 6d. and 2s. according to quality; it is now only 4d. per lb. on all sorts.

(535) *Coir and Coconut Oil* being both the products of the cocoanut palm or *Cocos nucifera*, equally exported to Europe, may be noticed together. The palm tree may be seen in almost every part of the island but its favourite locality is the low country within twelve or fifteen miles of the sea coast. The natives believe most firmly that these trees will not thrive out of reach of the sea beach and the salt spray from the ocean; and accordingly, when planting their young palms at any distance from the coast they place a quantity of salt about its roots. That this is erroneous may be seen by examining those trees nearest the sea "they will be found far less fruitful than those a short distance away. The fact is that the soft roots of the coco palm grow more rapidly in the light sandy soil of the low country whilst at some distance inland the ground is too hard for them, and the temperature too low, especially at night. They are chiefly to be found skirting the coast from Calpentin in the north west province to Matura in the southern province. The natives have been accustomed to treat these in the same manner, as their coffee and cinnamon, leaving the young plants to take care of themselves, exposed to the destructive attacks of wild animals and insects. In this manner twelve and often twenty years are required to bring a cocoanut tree into bearing, the wonder being that these neglected palms ever bear fruit at all. Of late years European capital and skill have been brought to bear upon this produce with remarkable results. In the western province about 6,000 acres are now covered by fine cocoanut trees, many in bearing at their fifth and sixth years. In the northern province about 10,000 acres have been cultivated in the same manner, whilst on the eastern coast from 3,000 to 4,000 acres are similarly planted. The ordinary yield of a good tree in full bearing is 50 cocoanuts yearly; many trees on European lands produce from 150 to 200 per annum. For the European market the tree is only available as producing coir, fibre, and rope from the outer husk of the fruit and cocoanut oil from the kernel when dried in the sun. The manufacture of cordage and rope dates back before the Portuguese period. During the Dutch rule this was an important branch of native industry, and the trade in them became a source of considerable profit to those servants of government who were allowed the monopoly as a remuneration for their services. When properly made from good fibre coir rope is very soft and of a bright yellow colour, but in quality the manufacture of the present day cannot compare with that of the old Dutch time. In Ceylon scarcely any other rope

or cord is used than coir; even the planks of the Singalese trading *Bhories* of 50 to 100 fons are fastened together by coir yarn alone. This manufacture is confined to certain districts between Colombo and Galle along the south coast. Coir is exported to this country not only in yarn and rope, but in the fibre in bales closely pressed "the total shipments of all sorts have lately been about 30,000 or 40,000 cwts. to Europe and 20,000 cwts. to the state of India and colonies. The manufacture of cocoanut oil for shipment to Europe has only been carried on during the last twenty-five years although long previously made by the natives for their own use. The bullock mill employed by them to crush the nut and express the oil is of the rudest make and has remained unimproved for the last 500 years: a good description of it may be seen in Davy's account of Ceylon. The first steam oilmills and hydraulic presses were erected by the Government in 1829 and when found to work well, and the article had become known and valued in this country the establishment was sold to private parties. This oil has ever since assumed an important place amongst the exports of the island. In 1849 the quantity shipped to England was 512,457 gallons, in 1850, 792,791 gallons and in 1851, 322,500 gallons. It is this oil which forms the foundation of Price's Patent Candles: it is also much used by soap and pomatum manufacturers. The quantity consumed in the island must be annually about half of the above quantities.

(536) *Sugar* as already observed is the only article the manufacture of which has been introduced into Ceylon by Europeans. The first canes planted with a view to the manufacture of sugar were carried thither from the Mauritius in the year 1832; they were planted in the central province, in the valley of Dambara. The first few acres produced abundantly and of a good marketable quality, prices in the country being then high the early shipments left a fair profit, whilst that sold on the spot paid handsomely. Several sugar estates were a few years later formed in the Kandyan country and eventually eight or ten plantations of some magnitude were commenced in the southern and western provinces. Experience has shown that although one or two good crops may be obtained from newly planted land, the soil is naturally of such a poor nature as to render after cultivation hopeless without an outlay for manure which the crops will not justify. From 1846 to the present time sugar cultivation has been gradually abandoned and at the present time there are but three estates in partial cultivation, and that almost entirely for local consumption. The largest quantity shipped to England in any one year was 10,000 cwt.

(537) *Cardamoms* are collected by the na-



tives in the central and some parts of the southern and western provinces from plants growing in a wild state amongst dense forests or low jungles. In appearance and strength they are inferior to those brought from the Malabar coast, and sell here for about one half of the value of the latter. Very little care is given to their drying and packing, which is of course injurious to their appearance, and there can be little doubt but that were the plants grown in the many village gardens, together with other produce, a very marketable article would be the result. The shipments of this do not exceed 100 to 150 cwts. annually.

(538) *Ebony* is found in great abundance in the north of the island, and to some extent in the Kandyan country. The great weight of the timber renders its transport very costly unless where water conveyance can be obtained which is seldom the case but during the rainy months. Immense forests of this wood are still existing in the island but to a great extent too far from a port of shipment to be available. The exports of ebony have varied much of late years from 15,000 to 5,000 cwts.

(539) *Sapan or Dye Wood* is shipped to this country where it is employed as a red dye. The tree of which this is the mature woody part, grows abundantly in the western—southern and central provinces, without any cultivation. It is fit for cutting when about five years old, at which time it attains a height of ten or twelve feet. The exports have been for the last few years about 6,000 cwts. annually.

(540) *Essential Oils* of cinnamon, citronelle and lemon grass are made chiefly in the neighbourhood of Galle in the southern provinces. The oil of cinnamon is also made largely at Colombo: it is, obtained from the broken or inferior pieces of bark rejected in packing the bales of spice. The other oils are the produce of two highly scented grasses cultivated to a considerable extent by both natives and Europeans for the purpose of distillation. The extent of the trade in these may be thus stated, say for 1849 oil of cinnamon 32,400 ounces, oil of lemon grass 28,000 ounces.

The second division of this paper includes tobacco, preca-nuts, cocoanuts and arrack as articles exported only to the neighbouring states as well as consumed upon the island.

(541) *Tobacco* is cultivated with some attention and success by the Singalese of the western province, the Kandyans of the interior and the Tamils of the northern districts of the island. The Dutch bestowed some care upon this article but they do not appear to have succeeded in obtaining tobacco suitable to European markets. At the present time the natives frequently prepare a leaf which is mild and fragrant in use although unsightly in appearance, but the bulk of the tobacco is coarse and rank.

This arises from no want of labour expended in the culture but rather from the leaves being gathered when too old and from imperfect curing.

The Singalese are very careful in the selection of ground for this plant as well as in its treatment prior to and after planting. Manure is applied to the land in the first instance and once or twice to the young plants which are also kept constantly watered during dry weather. Not a weed is allowed to appear amongst them and every care is bestowed that is likely to forward their growth. The gathering and drying processes are managed with as little discretion as can be imagined. Very small attention is paid to the state of the weather at the picking time and when gathered the leaves are left in heaps until they commence to ferment, when they are suspended on strings or the stalks of the coconut leaf. One estate has been formed by a European in the southern province, but at present with doubtful success. The principal export of tobacco is to the Travancore country on the Indian continent, a little goes eastward and some to the Maldivé Islands in exchange for saltfish, shells, and mats. The yearly shipments have of late amounted to about 22,000 cwts., at one period they reached 40,000 cwts.

(542) *Areca or Betel nut* have for a long period formed a large item of the export country trade. These nuts are used by nearly all Asiatics who masticate them with a little lime much in the same way as tobacco is used by sailors. The first luxury which a young Singalese or Malabar indulges in is a metal betel box worn in the girdle and those who are too poor for such an ornament content themselves with wrapping their daily supply in a leaf. The areca palm which produces this nut is one of the most graceful of that tribe: it thrives at a much greater altitude and in a cooler temperature than does the cocoa-palm, though like the latter it prefers the light soil and damp heat of the low country. Although flourishing wherever the coconut tree is found, the districts in which the areca tree grows most abundantly are about the borders of the western, central and north-western provinces (between Hurriegalle and Mattele.) The fruit grows in clusters similar to those of the coconut at the summit of the tree, each tree yielding about 200 yearly. They are about the size of a large walnut and when deprived of their shell which is of no value the nut is found to be equal in size to a nutmeg. They are exported to Calcutta, Bombay, Madras, Singapoer, Penang, and the Maldivé Islands, to the yearly value of £30,000.

(543) *Cocoa Nuts* also form a prominent feature amongst the exports to Indian states, both in the raw and dried state; in which condition they are known by the name of Copperah. It is scarcely possible to over-estimate the value of

the cocoanut palm to the natives of Ceylon and other parts of India. With it they may be said to be independent of all other means of subsistence and with a little cotton for a girdle, they could exist without any other resource. Not a part of the tree is useless, every portion is made to minister to the daily wants of the grower. Oil, vinegar, arrack, toddy, sugar, medicines, are produced from the nuts and the sap of the flower. The husk of the fruit yields him fuel, fibre for ropes and cordage with which he rigs ships and canoes and secures his cattle and his fences, and when unspun forms a soft mattress for his couch. The inner hard shell is converted into boxes, drinking vessels, spoons, forks and a variety of ornaments. The wood of the tree serves to construct chairs, tables, window frames, and beams and rafters for the roof, which is thatched by the plaited dry leaves of the tree fastened down by the fresh green leaflets. These plaited leaves also form a substitute for plates and dishes. The hollowed trunk of the tree forms a good canoe in which the villager puts off to fish with a net of coir yarn whilst the smaller trees form useful spouts to carry off the rain water from the eaves of his little hut. The cocoanut when but half grown contains a rich sweet cooling liquid termed milk though as clear as spring water, around the inside of the shell is a coating of young nut soft and agreeable to the taste. These two parts of the fruit form the simple meal of many thousands of the natives. When fully ripe, the kernel thick and hard, and the milk has nearly disappeared, in this state it is employed in curries or when dried, into copperah for oil making or exporting. The shipments take place chiefly at Galle and Colombo, and amount in value to about £14,000 yearly.

(544) *Arrack* is a spirit distilled from the fermented juice of the cocoanut flower and is prepared in certain districts of the southern province of the island under licenses from the government. It is an article scarcely known in this country being very seldom imported; during the Dutch period in Ceylon a good deal of it was shipped to Holland and Java but for many years past the only exports have been to the Indian presidencies and some of the eastern islands. Until within the last ten years arrack was served out to the troops in the Madras presidency, of late however they have had in place of it East India rum. Of the total quantity of this spirit made there are no records. The right of vending it in shops or bazaars is farmed out annually in each province under the title of the arrack rent and generally realizes about £52,000. The shipments of arrack have fallen off from 1,000 pipes in 1845 to 520 in 1850. The third division of Ceylon vegetable produce comprises cotton, rice, pepper, jaggery, arrowroot, maize, manioc and fine grains.

(545) *Cotton* is grown very generally by both the Singalese and Tamil inhabitants of Ceylon but upon no regular plan nor to any extent; in some few cases the villagers produce more than they require and barter their surplus stock with the travelling pedlars for a little salt or dried-fish. In the northern and eastern districts some few landholders rear considerable patches of an inferior sort of cotton which they dispose of to the weavers of Jaffna and Batticaloa, but nearly all the cotton goods manufactured in the island are from imported yarn. Attempts have been made on several occasions to introduce American cotton seed with improved culture but as yet without any decided success. Fine samples have been produced valued in this market at from sixpence to eightpence per pound, but either from exhaustion of the soil, or the heavy cost of production these experiments have ceased. The Singalese method of cultivation is to place four or five seeds in a patch between their young cocoanut plants or plantains at the commencement of the rains in either monsoon. The seedling will be thinned out when a few inches high and afterwards weeded once or twice by hand, but no further care is bestowed upon them until the pods are ready for gathering which they will be in about three months from the appearance of the seedlings. The means used to free the cotton from its seed are as simple as it is possible to conceive. The article is placed in a rush bag held by one hand whilst with the other a cross stick is rapidly twirled round amongst the cotton tearing away the fibres from the seeds. In the north, the Tamils pass their cotton between two wooden rollers revolving slowly against each other and which draw the fibrous substance through whilst the seeds being detached fall to the ground. The staple of Ceylon cotton is very short, but of a beautiful silky texture and frequently very white. It is impossible to say with any certainty what quantity of this article is annually produced.

(546) *Rice*. Of the very highest importance to this and other eastern nations is *Rice*. It is to them what corn, and potatoes and animal food are to Europeans. Few Singalese taste much else save cocoanuts during the year, every villager is anxious to secure a patch of ground commanding water, on which he rears this essential article of food. Although the present population of Ceylon does not exceed nine individuals to the square mile it is yet found that the land does not produce nearly sufficient for the wants of the people, the annual importations of grain amounting in value to about 450,000l. Of this sum fully two-thirds consist of rice prepared or in the husk which gives about two bushels for every inhabitant, the grain being valued at two shillings the bushel. Three hundred years ago the population of the island was undoubtedly far greater than at pre-



sent yet at that period the inhabitants not only raised sufficient corn for all their wants but were enabled to export it in some quantities to the eastward. The gradual destruction of the gigantic tanks which formerly existed in the northern districts, for the irrigation of the low lands, has led to the depopulation of that part of the island whence were drawn the chief supplies of corn. To cultivate rice without a plentiful supply of water would be impossible. In the hilly districts, irrigation is carried on by means of watercourses cut along the sides of mountains or carried through bamboos across valleys often for a distance of many miles. In the low country or maritime provinces the rivers are dammed up during the rainy months, and the streams carried over the rice lands from which they are gradually drawn off by means of small channels cut in the margin of every field: of so much importance is a good supply of water for cultivation that the native sovereigns of Lunka believed they performed as righteous an act in constructing a tank or a watercourse as in erecting a temple. In Ceylon there are eleven kinds of rice grown, viz. Ratcoonda, Ballanwary, Marlawarigey, Combilley, Tattewell, Heienette, Sudheenette, Moodikiriala, Coorovie, Balla maha-vie and the Dassa-analla. The first five are sown in March and reaped in July, the next four varieties are sown at the end of the May and gathered at the latter part of July or early in August, the two last kinds are sown in November and June respectively requiring five and two months to arrive at maturity. The cultivation of rice in the low lands and the hilly regions of the interior differs in many respects. The supply of water in the maritime provinces is generally more abundant and though less to be depended on than amongst the hills added to which violent floods frequently carry away the young crops for many miles around. The soil of the lands in the interior is far more productive than that found in the maritime provinces, though in each situation varieties will be found. Many lands amongst the hills will yield two crops annually and generally one, but in the low country the ground frequently lies fallow for several years. Few fields being rich enough to produce even a crop every alternate year. The yield of crops varies greatly according to soil, aspect, water and altitude, much land produces not more than three or four-fold, whilst some of the finest tracts in the interior yield as much as forty-fold. The Singalese have very little idea of manuring their lands in some parts of the low country bones are applied on the land with success, but the cultivators are content with turning in a few bullocks upon the land during fallow season. The Singalese have many superstitions concerning their agricultural operations and never commence work without consulting the priest or the devil dancer as to a lucky day.

They hold it to be unfortunate to commence work upon the first or second day in the Singalese month and after having begun their operations they must desist for a few days at certain intervals. In like manner the threshing of the corn is attended with various observances and charms are placed around the fresh gathered crop. When a newly sown field has been reaped the owner would not dare to partake of any portion of the crop until an offering of a small portion of it had been made to the nearest temple, in order that the priest might first eat of it. The rice lands in the low country are seldom cultivated by the proprietors, they are usually given in charge to one or two villagers who with the aid of their neighbours prepare the ground and attend to the irrigation. The owner finds the seed and shares equally with the cultivator in the produce. In the Kandyan country the proprietors usually cultivate their own lands with the aid of their poorer neighbours who are paid in rice or the labour given is returned upon the neighbour's fields. Pepper although only grown in sufficient quantity for local consumption was at a former period an article of some importance amongst the exports of the island. The Dutch paid great attention to it and spared no efforts to induce its cultivation both in the low country and in the Kandyan districts. By the Dutch records it appears that during the early part of the last century the shipments of this spice amounted to nearly 50,000 lbs. of which one third was received in barter from the Kandyans the remainder was grown at Battacala, Calpenty and Negombo. Since our possession of the island pepper has never been grown in any quantity and when the government determined on shipping it loose amongst their cinnamon bales in order to preserve the latter from sea damage the spice had to be obtained from the coast of India. The little that is now grown can scarcely be said to be cultivated, it is left almost entirely to chance and consequently yields very indifferently.

(547) *Jaggery or native sugar* is produced abundantly in the northern districts of Ceylon from the juice of the Kittool or Jaggery palm *Caryota urens*. The sap is drawn off much in the same manner as that from the cocoa palm, but it does not flow so readily, and to obviate this the natives are in the habit of inserting within the surface of the cut flower spike a small mixture of lime, garlick, salt, and bruised pepper. This is left on the incision for a few days, when it is removed and the flower again cut, the sap will then flow readily for several months continuously. The collected juice is boiled in earthen vessels to a certain consistency when it granulates and forms a fair sample of sugar capable of being refined to a good degree of purity. It is a curious fact that the wood of these trees which have been thus tapped is very much har-

der than that of the unemployed trees in the forests which is quite soft and spongy, the trees longest tapped are much the hardest.

(548) *Arrowroot and Manioca* are both rather extensively grown in the maritime provinces, the former being inferior in quality to that grown in the West India Islands. They are both very exhausting in their effect on the land, which in those parts of the island is seldom fertile, consequently it is but rare that more than one crop of either can be taken from the same field without long rest. From the Manioca the Singalese prepare a fine flour resembling arrowroot but much sweeter and far more nourishing. Boiled or bake with milk it forms a most delicious meal, partaking of the nature of a rich custard.

(549) *Maize or Indian Corn* is not grown to any great extent and its cultivation is confined to the eastern and northern districts. It is employed in a variety of ways, in curries, ground into meal or boiled whole as a vegetable. It is also given to the working bullocks with oil cake and cotton seed and is highly esteemed for this purpose.

(550) *Grains*. The fine *Grains* of Ceylon comprise a great variety of seeds employed by the poorer classes as articles of food. The principal of these are Koorakam, Cooloo Moongatta, Pama Abba, Ammodo. They as well as an inferior description of Rice called Hill Paddy are grown on poor lands and yield a very small return often not more than three fold. They are used in various ways, some being eaten in curries, some simply boiled, whilst others are ground, and the flour made into cakes or bread. These grains require no irrigation though their yield depends upon the quantity of rain which may fall during the early period of their growth, and from the poverty of most of the soils on which they are raised whole crops are frequently lost in a very dry season. In the sowing and harvesting of these products the Singalese observe no ceremonies and hold no superstitions regarding lucky days or evil spirits. A circumstance worthy of note as being the sole exception to their many superstitious observances.—*Jour. of the Roy. As. Soc* p. 266.

(551) *Ginger*. Mr. G. H. K. Thwaites, the superintendent, in his Annual report for September 1854 to August 1855 inclusive writes, that the cultivation of the West India ginger in Ceylon has been successful, and that it is likely to prove ere long an important article of commerce, that the vanilla succeeds in the gardens and has produced abundance of fruit, that the cochineal insects did not thrive. The Manilla hemp, the China grass cloth plant, and the Durian trees, were growing well. There are several oils which might be exported from the island. Among these he notices Keena oil obtained from the seeds of different species of *Calophyllum*; Meeriya oil yielded by

the seeds of several species of *Isonandra*; and Madol oil from the seeds of a species of *Garcinia*. The resin called Doon-Doommalle is also likely to be a valuable article of commerce. Attention is being directed on the island to the preparation of fibres from species of *Musa*.—*Edin. New Phil. Journ*, Vol. III. No. 41. April 1851, p. from 364 to 365.

### (552) CHUSAN SHELLS.

Described by W. H. BENSON, Esq., Bengal Civil Service, Collected by Dr. T. Cantor. Under the head "Mollusca" will be found a tolerable list of the Molluscan animals of the countries to which this work relates, but we give here merely a few of the shells of particular localities.

List of Shells, presented to the Museum of the Bengal Asiatic Society by Dr. Cantor, in 1842.

#### 1.—From Chusan.

*Helix*, *ravida*, Benson.  
 ——— *caprina*, Benson.  
 ——— *nanoides*, Benson.  
*Clansilia* *pluvialis*, Benson.  
 ——— *aculus*, Benson.  
*Achatina* *erecta*, Benson.  
*Planorbis* *papyraceus*, Benson.  
 ——— *hemisphaerula*, Benson.  
 ——— *compressus*, Hutton.  
*Limnaea* *pluictula*, Benson.  
 ——— *minor*, Benson.  
*Paludina* *quadrata*, Benson.  
 ——— *lecythoides*, Benson.  
 ——— (*Bithinia*) *longicornis*, Benson.  
 ——— (*Bithinia*) *striatula*, Benson.  
*Melania* *cancellata*, Benson.  
*Batillaria* *zonalis*, Benson.  
*Dreissena* *purpurascens*, Benson.  
*Modiola* *senhousia*, Benson.  
*Anodon* *gibbum*, Benson.  
*Corbicula* *fusca*, Lamarck.  
*Venus* *sinensis*, Lamarck.  
*Sanguinolaria* *iridescens*, Benson.  
*Arca* *gulaetodes*, Benson.

#### 2.—From Macao.

*Helix* *similaris*, Benson.  
*Achatina* *erecta*, Benson.  
*Succinea* ——— ?  
*Littorina* ——— ?  
*Littorina* ——— ?  
*Mytilus* ——— ?

#### 3.—From various localities.

*Placuna* *placenta* ?

This shell is used by the Chinese as a substitute for panes in windows. Several junks loaded with these shells, arrived at Chusan, in 1840. They were said to be collected on the shores of Formosa, and the Loo-choo Islands.

*Placuna* ? Found in a house in Ting-hea.  
*Pecten*. Found in a house in Ting-hae.  
*Halotis*. From the Island of Quel-paert.  
*Agaricia*, (Lamouraux). This beautiful un-



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described Madrepore is said to inhabit the shores of Chin-choo. (Fokien Province).

The following memoir was written so far back as 1841, and was embodied by Dr. Cantor in his 'Descriptive Catalogue of animals collected at Chusan' drawn up by order of Government, as already explained in an editorial note which will be found at p. 624, of the last Vol. of this Journal. Dr. Cantor's report was not as intended, published at a time when the result of his observations would have excited the most interest, and what were novelties in 1841, have subsequently been described and made known, by other Zoologists. Mr. Benson's memorandum, however, on the Chusan Shells is so complete in itself and so likely, notwithstanding the time which has elapsed since it was written, to prove of assistance to Indian Conchologists that the Editor has obtained the author's permission to publish it.—ED.

### (553) INCILARIA Nov. gen.

From *Incile*, a gutter, with reference to the gutter-like channel, which divides the mantle from the foot.

Corpus elongatum, postice attenuatum, repens, undique velo marginatum. Tentaculis quatuor, superioribus oculiferis, inferioribus integris. Foramen commune latere dextro non procul ab extremitate antica veli situm.

This animal is clearly not a slug (*Limax*), from the occurrence of a general, instead of a partial shield which covers the body nearly to the extremity like a mantle. It differs, however, from *Onchidium*, Buchanan, *Vaginulus*, Cuvier, and *Veronicella*, Blainville, in having the common orifice at the right side and near the posterior extremity under the mantle, but in the anterior part of the mantle as in *Arion*. From *Onchidium* it differs also in having the lower tentacula or appendices whole, and not bifurcate or palmated. The animal forms a connecting link between *Arion* and *Onchidium*. I have not access to any description of *Phylomique* or *Eumele*, indicated in p. 153, Rangs Manual des Mollusques, as brought to De Ferrussac's notice by M. Rafinesque.

### (554) INCILARIA BILINEATA, Benson.

Corpore livido, velo punctis maculisque fuxis conspersis ornato, lineis duabus lateralibus nigrescentibus, unico obscuriore mediano strigato.

"NOTE.—Dr. Cantor's notes on habitat, locality, uses &c. and included in the lines with inverted commas. "Found in the earth under the roots of trees. Great numbers were seen at night above ground on plants and trees, also on rainy days, when they appear suddenly. This slug appears to be a favourite prey of a toad (*Bufo gargarizans*, Cantor) which swarms at night, and on rainy days, and I once observed a spider, (*Latrodectus limacida* Cantor MS.) seize one of these slugs. The Chinese apply the slug as a poultice for bruises, &c. The

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respiratory orifice is very minute. The sketch represents a good sized specimen creeping on *Stillingia sebifera*"

### (555) HELIX RAVIDA, Benson.

Testa subglobosa, umbilicata, epidermide olivacea, anfractibus sex transverse subplicatis, ultimo ventricoso, suturis impressis, umbilico mediocre; apertura suborbiculari elongatiuscula; labio reflexo, tenni explanato labro acuto.

Axis 1.3.—Diam. 1.33.

This shell is nearly related to *H. pomatia*, but has more depressed whorls, and a shorter spire in proportion. The apex inclines more to a point than in *pomatia*. It has not the thickening of the peristome which is so marked in that species.

The colour, sculpture and smaller size also serve to distinguish it. The length of the aperture slightly exceeds the breadth. The colour of the epidermis in the lower whorl is more saturate than in the upper ones.

"Inhabits trees, mossy stones, rocks, crevices and the earth; common at all times in shady places, particularly abundant at night, early in the morning and on rainy days. The animal is used by the Chinese in headache, and for bruises. The shell is removed, and the animal applied to the suffering part."

### (556) HELIX TAPEINA, Benson.

Journ. Asiatic Socy. Vol. 5, p. 352 No. 7. This shell was originally described with a collection from the N. E. Frontier of Bengal, in which Chinese forms began to mix with those of our eastern provinces.

"Only two specimens, which occurred on the stem of *Salisburia genko*, were found, at sunrise. The Chinese had no name for the snail, and were evidently not acquainted with it, from which it would appear not to be common."

### (557) HELIX NANINOIDES, Benson.

Testa solidiuscula, subdiscoidea superne radiatum, tenuiter striata infra striis laevigatis, distantibus. Spira depresso-conoidea, apice obtusato planulato; apertura transverse lunata labro obtuso crasso, infra subreflexo.

This shell is nearly related to, and is probably one of the terminal species. The want of gloss, observable above, shews that it is not endued with the lubricating processes which exist on the mantle of *N. vitrinoides*. The under side is somewhat polished.

Dr. Cantor found three shells at different times lying on the ground in his garden at Ting-hae but never saw it alive nor did the Chinese know it. It is common at Singapore and Penang.

### (558) CLAUSILIA FLUVIATILIS, Benson.

Testa fusiforme pallide olivacea, spira attenuata, crystallina apice papillari; anfractibus 14, medianis ventricosisioribus, omnibus leviter transverse striatis. Peristomate valde reflexo planato, ad basin labii plica obliqua, solida, sulcoque concurrente munito.

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Axis 1. I poll.

This beautiful shell, which is much larger and more narrow in the upper whorls than *C. loxostoma* of our N. E. Frontier, is distinguished by the curious canal which cuts obliquely through the reflected peristome at the base of the inner lip, and which is margined above by an incrassated prolongation of the lowermost internal plica. The peristome is as broadly and suddenly reflected, as in the Maltese *Cl. labiosa*. In form it approaches the Dalmatian species *Cl. laevigata*, but it is more ventricose in the lower whorls, and more attenuated in the upper. The delicacy of the oblique striæ imparts a silky lustre to the epidermis. The base of the shell has an oblique keel at the back of the canal on the peristome, as in *Goniostoma*, Swainson (*Bulimus goniostoma*, Sowerby. Zool. Journ. Vol 1.) Swainson has placed *Clausilia* among the *Achatinidae*, and the discovery of this interesting species will go far to prove the propriety of the location. This shell represents the subgenus *Goniostoma* in the neighbouring group of *Bulimus*. Among the *Achatina* proper it would seem to represent *Achatinella*, in which the emargination at the base of the inner lip is fortified by a thickening of the base of the columella.

This *Clausilia* was only observed after heavy and protracted falls of rain when Dr. Cantor found at different times three specimens lying on the ground. Eight other specimens were found by digging in the wet earth, where they appeared in company with the smaller *Clausilia aculeus*. The animal is like that of *C. aculeus*, and differs only in size, and in being of a greyish black colour.

(559) *CLAUSILIA ACULUS*, Benson.

Testa subulata nitida, epidermide fusciscenti, anfractibus 10 aut 11. oblique leviter striatis; apertura dentibus duobus vel tribus munita, peristomate reflexo.

Axis longioris 0.65, minoris 0.5 poll.

There are two sizes of this shell; the dwarf kind appears to be the more abundant. It varies in the presence or absence of the lower plait or tooth, as do some of the European species. Neither of the larger specimens, which I have under inspection shews any trace of it while in the dwarf variety it is more frequently exhibited than otherwise. The specimens appear to be by no means liable to truncation.

"Lixer in the earth on mossy stones, walls and trees. Appears in great numbers in rainy weather. The Chinese call this species by the same name as *C. pluvialis*."

(560) *ACHATINA ERECTA*, Benson.

Testa albida, solidiuscula, subulato turrata, epidermide foeda, scabra, anfractibus octo planulatis, suturis impressis, apice obtuso.

This shell belongs to the same division as, and is closely allied to our Indian *Bulimus*

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*gracilis*, Hutton, and *Bulimus clavulus*, of the West Indies, which Sowerby arranges as an *Achatina*. In all these shells there is a slight evasion or sinuation of the base of the mouth, occasioned by the protrusion of the outer lip; but in none of them is there the decided truncation of the base of the columella which distinguishes the true *Achatina*. Dr. Cantor's shell approaches most nearly to those forms of *Achatina* which are represented by *A. octona* (subgenus *Macrospira* Swainson,) but it cannot, notwithstanding its elongated form and oblong aperture, be received into Swainson's subgenus *Leptospira*, by which he makes the transition to *Achatina* from *Bulimus* with reference to the character assigned by him to the outer lip of *Leptospira*; and it agrees still less with his figure of *L. signata* which possesses an exerted aperture with a free border. It is nevertheless not distantly related to *Bulimus decollatus*, which he would place in that subgenus. In one adult specimen sent, the inner lip and base are considerably thickened by a deposition of shelly matter, added like an anterior lip after the animal had attained its full growth. In its habit of carrying its shell erect, the animal differs from our Indian species which although it occasionally lifts its shell a little, ordinarily trails it behind.

"Invariably found in company with *Clausilia aculeus*. Except in colour, the animals are alike. In habits they differ only in one respect. The *Clausilia* drags the shell along with the apex touching the ground, while the other carries the shell erect on its back. *A. erecta* was also found by Dr. Cantor at Macao, although not accompanied by the *Clausilia*, which he only met with at Chusan.

(561) *PLANORBIS PAPYRACEUS*, Benson.

Testa compressa, olivaceo-cornea, sub polita, minutissime radiato-striata, anfractu ultimo latiori, supra infraque æqualiter, convexo; periphæria carinata, spira basique ambabus depressis, umbilicatis; umbilico inferiori rectiori; labro superiori valdè prominente, semicirculari; inferiori recedente, recto.

Diam. O. 4. poll.

"Found in canals and ponds attached to *Chara*; not numerous. It is to be observed that the canals at Chusan communicate with the sea (those of Ting-hae of course more immediately so,) and although the water is fresh and inhabited by frogs, fresh-water fishes, *Dytiscus*, *Nepa*, and covered with *Lemna* and *Chara*, yet it is mixed with salt-water in the vicinity of the sea, which may account for the appearance of marine Crustacea and Testacea."

Whorls 4 in number. This shell seems to take its start between the depressed *Planorbis* (as *marginatus*, *carinatus*, *spirorbis*, *vortex*, etc.) in which the angle of the penultimate volution scarcely enters the mouth of the shell, and the Sylhet species *umbilicalis*, the English *nitidus*,



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the Bengal *trochoides*, in which the angle of the penultimate whorl projects far into the cavity of the mouth. In its compressed form it assorts with *carinatus*, while in the character just noted, in the great comparative breadth of the last whorl, and in the somewhat contracted umbilicus it approaches to *umbilicalis*. The arcuated and nearly semicircular upper lip forms a bow, of which the straight lower lip replaces the chored, and joining on to it at the sharp periphery, gives the mouth a very singular appearance. "Dr. Cantor has lately discovered at Serampore and Barrackpore a new species, belonging to this type of form which is closely allied to *umbilicalis*."

In this description, I have considered the shell as dextral. On a former occasion I gave my reasons with reference to the position of the animal in the shell, and Mr. Gray, who quotes my observations, states that M. Desmoulins who has examined the question in detail, concludes that the shell of *Planorbis* is essentially dextral, and that a displacement to the left side of the extremities of certain organs which are themselves on the right side has led to the erroneous opinion, derived from imperfect anatomical investigation, that the animals were sinistral. Swainson, somewhat strangely seemed to be unaware of this investigation, when he noted that one of the characters of *Planorbis* was a reversed aperture. I have not referred this shell, nor the next, to any of his sub-genera of *Planorbis*. He evidently has not worked them out, nor traced their analogies to the families of the *Phytophaga*. This sub-genera *Planorbis* and *Helisoma* appear to be scarcely distinguishable by their descriptions, as will appear from the following table, in which I have merely transposed all that Swainson says regarding them for the sake of the juxta-position of the characters, putting my own observations within brackets.

Sub-genus *Planorbis*, Drap.

*P. corneus*.

1. Spiral-whorls few.
2. Body-whorl ventricose
3. (Note, This may be said to be the case in *Pl. corneus* it matters not which side be regarded as containing the apex)

Sub-genus *Helisoma*,

Sow. *H. bicarinata*,

1. Whorls hardly three.
2. Shell ventricose.
3. The spire sunk below the body-whorl.

I have not Sowerby's Genera to refer to for the type of *Helisoma*, but if it be intended for the reception of forms similar to that next to be described, and which is par excellence, of the Heliciform type; and if *Helisoma* be an unclassical abbreviation of the hybrid word *Helicosoma* in allusion thereto, then the depression of the spire must have reference to the depth and construction of the umbilicus on the really lower side, and the character "shell ventricose" must refer to the convexity (in the more typical species) of the upper side of the shell. If Swainson

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should not have intended to characterise this type, I would propose the term *Helicorbis* for it, and would offer the following incomplete sketch of an arrangement. I have omitted *Segmentina*, Fleming; as though its singular internal divisions make it represent the *Cephalopoda*, yet its form does not separate it from the sub-genus in which *Planorbis nitidus* will be found, and it is not representative, quoad that structure, of any of the families of the tribe to which it belongs.

Families of the *Phytophaga*. Analogies. Subgenera of *Planorbis*.

1. *Helicidae*. Typical. *Helicorbis*? Benson.  
*H. hemisphaerula*, Benson.  
*H. nitida*, Gray's *Turton* Pl. 8. f. 93.  
*H. umbilicalis*, Journ. As. Soc. 5 p. 741.  
Aberrant. *H. papyraceus*, Benson.
2. *Trochidae*. Subtypical. *Trochorbis*, Benson.  
*Trochorbis trochoides* J. A. S. 5. P. 742.
3. *Halitidae*. Spire evanescent, Aperture patulous. *Planorbis*.  
*P. corneus* auct.  
*P. indicus*, Benson J. A. S. 5. P. 743.  
*P. corpulentus*, Say. Append. to exped. to St. Peter's River. Pl. 15. Fig 9.
4. *Naticidae*?\*
5. *Turbinidae*. Aperture rounded not encroached upon by the previous whorl. *Omalodiscus*, Benson.  
(† *Spirorbis*, Swainson)  
*O. marginatus*; *Spirorbis albus* &c.

\* Is this family a fair representative of the *Cypræidae* among the *Zoophaga*?

† This name having long been pre-occupied by a genus of *Annelides*, Swainson's sub-genus requires a change of designation. Swainson has also called a genus of the *Olivineæ* "*Scahula*," without observing that, in 1834, I applied the name to a fluviatile form among the *Arcadæ*. Zoolog. Joura. Vol. v.

(562) *PLANORBIS HEMISPHERULA*, Benson.

Testa nitida, olivaceo-cornea, supra convexa, apice planulata, infra excavata, umbilico coarctato; periphæria obtusa, nullo modo carinata. Diam. o. 25 poll.

This species, belonging to the circle of *Helicorbis*, is nearly related to the *Sylhet umbilicalis*, but differs in colour, in its greater convexity and narrower umbilicus. The periphery is rounded, not angulate; the spire has no depression below the surface of any of the whorls, while the underside is concave. I have another species of the subgenus in which the umbilicus is as narrow as in *Trochorbis*, none of the previous whorls being visible. It will form the passage from *Helicorbis* to that sub-genus; it is from the Indus at Sukker, is very minute, and was accidentally sent to me, secured from injury in the hardened mud which filled the aperture of a *Paludina bengalensis*, picked up with other well known shells of the provinces by a friend, on the bank of that river.

"*P. hemisphaerula* is found in the same localities as *P. papyraceus*, on *Chara*, *Lemna*, &c. It is not numerous."

(563) *LIMNAEA Plicatula*, Benson.

Testa elongato ovata cornea scabriuscula, anfractu ultimo transverse plicatula, suturis impressis; spira mediocri, apice acuto plerumque ferrugineo; apertura infra patulante, basi evasa.

This shell differs scarcely in shape from a *Limnaea* (*L. miscella*, nobis) common in the Rivers of Rohilkhund and in the River Goomty, which approaches in some of its characters very nearly to one of the varieties of *L. chlamys*. The present species may be distinguished from *L. miscella* by the want of polish, by the more deeply impressed sutures, by the slight plications on the last whorl, and by its coloured apex.

"Found in fresh water ponds, floating on the surface, or attached to *Chara*. *L. plicatula* is common."

(564) *LIMNAEA MINOR*, Benson.

Testa ovato-acuta, cornea, polita, spira vix dimidium testae efformante; apice obtusiusculo, anfractibus quatuor, suturis leviter impressis; apertura ovata, plica columellae obsoleta.

This very distinct shell was among the specimens of the last described species. The specimen under review is a small shell, and intermediate in form between the English *L. fossaria* (*minuta*, Lam. *truncatula*, Gray) and the large species of our Western Provinces, *L. bulla*, which again is nearly allied to the Bengal species *L. luteola* of Lamarck. From *L. bulla* it differs in its comparatively greater length of spire; from *L. fossaria* by the shorter spire and slightly excavated sutures.

(565) *BULLÆA CAURINA*, Benson.

Testa ovato-oblonga, alba, tenuissima, papyracea, transverse eleganter minutissimeque striatula; apertura auriformi supra angustata, infra patulante; labro apicem superante; spira nulla.

The part of the body-whorl which is visible when the aperture is turned towards the observer is small in proportion to the mouth. The sum-

mit of the shell resembles the same part in *Bulla navium* and *B. solida*, but the outer lip is destitute of the fold where it rises above the apex, which appears in those species; resembling, in this respect *B. ampulla*. The thinness of the inner lip locates this shell in *Bullæa*. Its being internal, probably accounts for the state of Dr. Cantor's specimens from the contraction of the cooked animals, compressing the very fragile shells. The same circumstance may have occasioned the want of success met with in the search for living examples.

"On entering a house in Ting-hae where the people had just finished their breakfast, Dr. Cantor observed a number of these shells (broken with but one exception,) on a dish. To an enquiry whence they came, the Chinamen asserted, that they were taken in the canal. Although Dr. C. offered a reward and almost daily dragged the canals, he was never able to procure another specimen. The same dish contained shells of *Paludina quadrata*, which is a favorite food of the Chinese, and is plentiful in all the canals, even close to the sea; and as the canals communicate with the sea, the *Bulloea* might possibly have been found in the locality assigned."

(566) *PALUDINA QUADRATA*, Benson.

Testa elongato-conoidea, crassa, epidermide viridi-olivaceo, anfractibus sex planulatis, leviter transverse plicatis, longitudinaliter liratis; liris subquinis, apertura mediocri, intus albido-violacea, umbilico arcto, peritremate nigrescente.

The slightly prominent longitudinal ridges (which, with the flattening of the whorls, contribute to give the shell a singular appearance,) vary much in number, and in some specimens are nearly obsolete. The operculum is horny. The shell in its thickness and sculpture indicate, an approach to the *Melania*, but the animal having the eyes on an exerted pedicle, differs therein from *Melania* in which the eye is sessile on the tentaculum. It also differs from the ordinary forms of *Paludina*, in which the eye supports seem to occupy a common tube with the tentaculum, and to be truncated at the point of divergence. The ridges of the shell are frequently invested with either a vegetable or a spongy growth, which gives it an appearance of having variegated bands, which do not properly belong to the epidermis.

"Extremely common in canals and fresh-water ponds, where it is found in the mud, and adhering to stones, wood, aquatic plants or any firm object which may happen to be immersed. The specimens vary in size; larger specimens were observed, than the one figured. In the female, Dr. Cantor found from 7 to 10 young ones of different sizes. This species forms a common and favourite article of food with the Chinese, and large supplies were exposed for sale in the market at Ting-hae."



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### (567) PALUDINA LECYTHOIDES, Benson.

Testa ovato-acuta, olivacea; anfractibus sex aut septem rotundatis, transverse subplicatis; suturis excavatis; apertura oblonga; peristomate subreflexo, nigro; apice acuto; umbilico ætate evanescente.

Nearly allied to Gray's *P. chinensis*, and to *Paludina lecythes* nobis (Journ. As. Soc. Vol. v. page 745.) It differs from the latter in its more produced form, more acute apex, the slighter convexity of the whorls, and its greater solidity. From *P. chinensis*, which has an eroded apex in the specimen figured, and which it resembles in habit, it differs in the absence of any angularity at the base of the aperture, which is also less oblique in the shell under review. In young specimens the olive-coloured epidermis has a lutescent tinge, and dark stripes accompany the plicæ of growth. The colours are darker in adults, and in one variety, the lower portion of the last whorl is ornamented by a series of light coloured longitudinal bands. In the very young shell, the aperture equals the spire in length; the spire is conoidal, and the peritrema of the last whorl, angular and sub-carinate. The same characters are observable in the embryo, but the apex, in the latter state, is produced in a papillary form.

"Lives in the mud in ditches and fresh-water ponds. Not numerous. The snail, when once removed from its native element, keeps itself shut up, although confined in water. It is a favourite food with the Chinese, who eat it prepared in the same manner as other edible snails, viz. boiled. The embryones, which vary from 8 to 12, are somewhat larger than those of *P. quadrata*, and their shells are colourless and semitransparent, whereas the embryo of the latter is frequently of a dark colour."

### (568) PALUDINA (BITHINIA, Gray) LONGICORNIS, Benson.

Testa ovato-conoidea, cornea, polita, spira aperturam longitudine vix superante; anfractibus quatuor, ultimo convexo, suturis minime depressis; apertura subrotunda, supra angulata; peristomate subreflexo, nigrescente; labio crassissimo; operculo testaceo; umbilico evanido; apice abtuso.

This shell appertains to the group of small *Paludina* which Gray has separated under the designation of *Bithinia*, to which belong the English *P. impura*, the Indian species *P. cerameopoma* and *pulchella*, (nobis), *goniostoma* (Hutton) and one or two other species, inhabiting the rivers and pools of the gangetic plains which as yet are undescribed. The present species is remarkable for the thickening of the inner lip in the part where it adheres to the penultimate whorl.

"Found in the canals in great numbers attached to aquatic plants, stones, pigs, &c."

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### (569) PALUDINA (BITHINIA) STRIATULA, Benson.

Testa ovato-acuta, cornea, polita; spira elongata; anfractibus quinque convexiusculis, liris pluribus, interdum inconspicuis, circumdati, suturis depressiusculis; apice obtusato. Peristomate reflexo, nigrescente, undato; umbilico evanido; operculo calcareo.

This form is singular among the *Bithinia* on account of the ridges on the whorls. All the other known species, including those above named, viz. *parrula* of the West Indies, *rudis* and *rubens* of Dalmatia, *fluminensis* of Hungary, *inflata* of the Ionian Islands, and a small Sicilian species which stands in collection without a name, being deficient in sculpture. The number and degree of prominence of the ridges vary much, and they diminish in prominence in proportion to their paucity.

"Less common than *P. longicornis*, but found in the same localities. The animals and their habits are similar."

### (570) MELANIA CANCELLATA, Benson.

Testa, elongato-turrita olivacea solidiuscula; anfractibus novem convexiusculis, omnibus costulis frequentibus, ultimoque fasciis tribus elevatis basalibus munitis; costulis liris plurimus cancellatis; suturis mediocriter excavatis; apice eroso.

Axis 1.0 poll. vel paulo plus.

This little species is nearly allied to the gigantic, *M. variabilis*, nobis, of Bengal, and like it, has the sinuated aperture, which indicates the approach of the genus to the neighbouring type: *Melanopsis*. There are seldom more than seven whorls present, the apex being subject to decol-lection, which in this genus, I have observed to be an indication of residence in stagnant water.

"Nearly all adult specimens somewhat mutilated. Found in the canals close to the sea in the mud, and makes its appearance in the market, not as an article of food, but in company with the fish caught by dragging the bottom of the canals."

### (571) MELANIA (HEMISINUS? Swainson) CEREBRICOSTIS, Benson.

Testa elongato-turrita, olivacea, tenui, anfractibus plurimis leviter convexis; costis frequentissimis albidis, lævigatis munitis, ultimo costulis evanidis; balteo submediano, rugisque plurimis basalibus circumdato; suturis impressis; columella subrecta; basi leviter canaliculato-effusa; labro tenui, lævi, sub-reflexo; apice decollato. Axis testæ decollatæ 1.05 poll.

This is a very interesting shell, agreeing nearly with Swainson's sub-genus *Hemisinus*, the type of which is figured in Griffith's Cuvier as *Melania lineata* (Vol. XII. Pl. 13. fig. 4). The Chusan shell however, shews no symptom of the crenation in the aperture, which is attributed to

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the type. The species now described leads to the sub-genus *Cerithidea*.

"Found among specimens of *Melania cancellata*."

(572) *BATILLARIA*, \* Nov. Gen.

\* *Batilla*, a shovel; from the lengthened form of the shell, and the conformation of the base of the aperture.

Testa turrita, insculpta, rudi; anfractibus plurimis, apertura oblonga, infra angustiore, basi truncata, evasa; labro sinuata, supra emarginato, infra protracto; labio supra callo munito; columella planata, basi incrassata, oblique truncata, canalem vix efformante; operculo corneo, tenui, spirali, multiverticillato.

(573) *BATILLARIA ZONALIS*, Benson.

Testa elongato-turrita, scabra, albida, fasciis fucis ornata; anfractibus tredecim mediocriter convexis, costulis liris longitudinalibus decussatis, supra sub-nodulosis; apertura intus fasciis fuscis strigata; columella alba, Axis 1.4 poll.

SYN. *Cerithium zonale*, Lam. l'océan des Antilles.

*C. zonale*, Gray, Griff. Cuv. 12, Pl. 14, fig. 1, China?

"From the coast of Chusan. Some were brought to Dr. Cantor from the entrance of the canal; but he did not himself find them in the estuary."

This shell does not agree with the characters of any of the sub-genera of the *Cerithium* in which Lamarck and Gray have placed it, and the structure of the base of the columella is almost precisely that of the *Planaxis*, Lamarck, from which the form is sufficiently distinguished from the truncation of the base of the aperture, its sinuous outline, and the absence of the interior ribs, as well as by the elongated form of the spire. Swainson has considered *Planaxis* to be a terminal genus of the *Melaniae*, and the present species in its form and sinuous lip presents characters in consonance with the typical species of *Melania*, while the columella approaches to the structure of that of *Melanopsis*. As in *Planaxis* and many of the *Cerithina*, there is a callosus attached to the penultimate whorl near the top of the aperture, and its scabrous surface and occasional disposition to form a varix on the last whorl behind the pillar, give a farther resemblance to that sub-family.

(574) *LAGUNCULA*, Nov. Gen.

Testa turbinata, subglobosa, apertura majori, integra, oblonga, peristomate interrupto, labio subreflexo, umbilico profundo, tortuoso.

(575) *LAGUNCULA PULCHELLA*, Benson.

Testa albido-glauea, ovato-globosa; anfractibus convexis, lineis longitudinalibus, elevatiusculis, aliis obliquis decussatis, instructis; suturis impressis; apertura intus fascia lata pallide castanea ornata, columellaque intus concolori.

"Asserted to be an inhabitant of the canals

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at Chusan, and found under the same circumstances as *Venus chinensis*."

The raised lines crossing each other, give the facet-like appearance to the surface, which is frequently observable in *Limnaea*. The form of the umbilicus and the greater prominence of the raised lines near the umbilicus show an approach to the subgenus *Globularia*. Whorls 5, exclusive of the apex, which is less acute, than in *Assiminia*. The substance of the shell is thin, and it has much the aspect of a shortened *Paludina*, such as *P. crassa*. It appears to be related both to *Assiminia* in the *Turbinidae*, and to *Lacuna* and *Globularia* in the *Natioidae*. From the former it is distinguished by its more globular form, and by the openness of the umbilicus, as well as by the absence of any distinct shelly plate, adhering to the body-whorl within the aperture. From *Lacuna* it may be known by the circumstance of the umbilicus being situated about the centre of the aperture, instead of near its summit, and by the same absence of a shelly plate. From *Globularia* it is distinguished by its more lengthened form, less concave inner lip, and by the absence of a thickened belt at the base of the body whorl.

(576) *MYTILUS NIGER*, Benson.

Testa oblonga, trigona; cardine unidentato; natibus subineurvatis, decorticatis, sub epidermide albis marginibus purpurascens; intus margaritaceo-splendida, margine purpureo. Long. 3.4 poll. Lat. 1.7.

It is punctuate in the interior, especially near the beaks. There are *Flustra* on all the specimens, leading to the supposition, notwithstanding their naere, that the habitat is marine.

(577) *DREISSENA PURPURASCENS*, Benson.

Testa oblonga sub-quadrata, radiatoplicata, sub epidermide albo purpureoque ornata, intus margaritacea, epidermide brunneo, apice subineurvato, compressiusculo Long. 1.5, Lat. 0.8 poll.

The anterior margin is minutely toothed. The posterior muscular impression is curiously honey-combed, and the whole of the interior is strongly punctuate at nearly equi-distant points. The plicae or raised striae are strong within a short distance of the beaks and along the anterior side of the umbonal slope, but become obsolete on the rest of the shell. The epidermis is scabrous and covered with a minute weed, which looks like a fresh-water production. The septum at the beaks refers this shell to *Dreissena* of Van Beneden, which includes the fluviatile species *polymorpha* of Europe.

"Dr. Cantor never saw those muscles alive, but found the empty shells about the houses at Ting-hae. The Chinese said that they were found in great numbers in the canals close to the sea, but only in winter, when large supplies are brought to market. They also asserted that they attain upwards of six inches in length."



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### (578) MODIOLA SENHOUSEIA, Benson.

Testa transverse oblonga subalata, gibba, læviuscula; antice angustata; intus iridescente; epidermide olivacea, obscurè radiata; ala nati-busque strigis flexuosis spadiceis ornatis, basi leviter emarginata. Long. 1.2, Lat. 0.6. poll.

Named by Dr. Cantor after the late Sir H. Le Fleming Senhouse, who first observed it and pointed it out to him. This gallant officer who commanded the naval forces in the attack on the city of Canton which resulted in its submission to the British arms, and who fell shortly afterwards a victim to his exertions in that engagement, was much attached to Natural History.

"Sir H. Le Fleming Senhouse observed numbers of this shell on board of one of the captured junks where specimens were obtained from the Chinamen, who had brought a large supply, preserved in salt, from the East coast of Canton Province. Dr. Cantor afterwards found two specimens on the mud among the fragments of rocks which line the coast of Chusan. People at Ting-hae were well acquainted with the muscle. Judging from the heaps of shells which lie about every house at Chusan, the people are great consumers of shell fish, and it is amusing to see how expert they are in opening bivalves, for which their inch-long nails are well adapted. Dr. Cantor later observed this shell inhabiting the shores of the Malayan Peninsula, Singapore, and Pinang.

The form belongs to the sub-genus *Brachydontes* of Swainson. A nearly allied, but much smaller, species occurs in the creeks of the Sunderbuns, which he proposes to describe as *M. Variegata*.

### (579) ANODON GIBBUM, Benson.

Testa fragili, ovata, tumida, antice rotundata, postice subalata, supra angulata, extremitate postica subangulata, natibus concentricè rugosis, rugis parallelis, sub-distantibus, area postica radiis tribus approximatis leviter elevatis, rugosisque, munita; margarita interiorius albida versus apicem aurantio-tabescenti, versus marginem purpureo-viridique splendide margaritacea; margine fusco; epidermide olivacea, obscure radiata. Long. 2.0, Lat. 3.2 poll.

This shell approaches in form and outward appearance so nearly to one of the varieties of *A. cygneum*, that at first sight, it might be difficult to distinguish them; but on opening the valves, the superior splendour and vivid colouring of the Chinese shell at once suggest a specific difference. *A. cygneum* shews vestiges of raised rays, similar to the three on the surface of *A. gibbum*, but in an English specimen, of the variety *incrassatum*, does not present the concentric rugæ on the beaks, which are exhibited by Irish specimens of another variety in which however, they are closer and more delicate than in the Chusan shell. The sub-cardinal muscular

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impressions are more immediately under the beaks in *A. gibbum*, while in the British species they are more removed towards the anterior side.

Sometimes 5 inches in length. Very common in mud in the canals. Sold in the bazaars as an article of food. Large specimens are very brittle, and precaution should be taken to dry them in the shade."

### (580) UNIO (THELIDERMA, Swainson,) LEAH, Gray.

Testa crassa, subovata, alata, compressa, umbonibus dentibusque cardinalibus extremitati antice angustiori approximatis; valva sinistra dente cardinali interiori margineque cardinali pene parallelis; illa versus dentem lateralem medioeriter productam spectante; valva dextra dente cardinali unica creata; valvis intus minime profundis; margarita; iridescente, pallide salmonis colore tincta; natibus minime prominentibus; rugis seriebus duabus e linea umbonali divaricatis; posterioribus simplicibus, anterioribus, basalibusque nodulosis, testam exteriorem mumentibus, epidermide flavo-olivacea. Length 2 inches, breadth 3, weights of the two valves 1½ oz.

The interior lobe of the cardinal tooth in the left valve is in a line with the lateral tooth, or nearly so. The anterior impression of the adductor muscle is finely sculptured in a radiate crystalliform manner. The epidermis is slight yellowish olive, verging into light brown. The posterior margin is sinuous, owing to the ends of the nodulous radiating ribs, which diverge in 2 curved series from the umbonal slope: those towards the posterior margin and wing being simple, while those which run towards the basal and anterior margin, consist of a series of nodules. The two smaller muscular impressions of the cardinal group are in this species situated transversely, one of them being remote from the large impression but in *U. divergens*, one is situated above the other, and both adjoin the large impression.

This shell is evidently the same species as that figured by Gray in Griffith's Cuvier, Vol. XII. Pl. 21, fig. 1, but without a description. The aspect of the shell, and still more that of *U. divergens*, reminds the observer of the thick nodulous forms which inhabit the waters of North America, and is quite unlike that of any of our Indian species, only one of which attains any moderate degree of thickness.

A perfect specimen of this and a single (left) valve of the next species were found in a house at Ting-hae. They are eaten by the inhabitants who asserted that the shell is found in fresh-water somewhere on the Island. At Macao, Dr. Cantor afterwards saw a specimen with a gentleman who had received it from a native of Canton. The latter asserted that the shell inhabited the mud in the Canton river, at some distance in the interior."

## CHUSAN SHELLS.

(581) UNIO THELIDERMA, Sw. DIVERGENS, Benson.

Testa crassa, angulato-ovata, subalata, tumidiuscula, facie externa tuberculato-plicata, rugis seriebus et quibus e linea umbonali divaricantibus; posterioribus simplicioribus, anterioribus basali-busque plerumque nodulosis; natibus mediocriter prominentibus, epidermide negrescente, striis subimbricatis. Valvæ sinistræ dente cardinali interiori versus angulum marginis posterioris basalisque spectante, ad latus exterius laminis pluribus munito; dente exteriori pene obsoleto brevi, a basi interioris divaricato; dente laterali brevi crasso. Long. 2.65, Lat. 3.5 poll.

The lateral tooth is nearly parallel with the direction of the inner cardinal tooth, instead of forming, as it were a prolongation of the same line, as in the last species. The anterior impression of the adductor muscle is irregularly reticulate. Anterior margin sinuous, from the protrusion of the extremities of the rugæ. Weight of a single valve  $2\frac{3}{4}$  oz. nearly. It is not very distantly related to the American species *V. costatus*, Rafinesque (*undulatus*, Barnes) figured in Conrad's Monograph in plate No. 17.

(582) CORBICULA FUSCATA, (Lamarck.)

Testa cordata subinæquilaterali fuscovirente, tumidiuscula, polita, intus et ad nates violacea, extrinsecus sulcis crebris circumdata, rugis intersitis subimbricatis; margine interiori plerumque nigrescente; natibus decorticatis. Lat. 1.3, Long 1.15 poll.

This appears to be *Cyrena fuscata* of Lamarck belonging to the division which Megerle has separated under the name of *Corbicula*, and which is well distinguished with reference to the minutely, serrated and elongated laminar lateral teeth. The plica on the outside of the valves are more distant than in our Indian species.

"Found in the mud in the canals; sold in the market."

(583) VENUS SINENSIS, Auctorum.

Testa orbiculata, convexa, albida, marginibus violaceis denticulatis, extrinsecus radiis violaceis plicisque concentricis exilissimis ornata; disco plerumque ferrugines; dente cardinali postico, bifido sæpe bilobato, laminæ cardinalis extremitate postica concavata. Long. 1.7, Lat. 1.65.

Iron. Wood, Pl. 8, fig. 76 non bene.

In most specimens, the coloured rays are confined to the posterior half of the shell; but occasionally, they pervade the whole dish, and decussate the concentric plaits in such a manner, as to deceive the eye, and to cause the belief that there is a radiate striate sculpture. The siphonal scar cuts sharply through the sub-marginal impression, and ends in a point near the centre of the shell, as in *Artemis lincia*, and in a less degree in *Venus gallina*.

"Dr. Cantor never saw this bivalve alive, but judging from the number of shells lying about

## CHUSAN SHELLS.

houses at Chusan, it must be a common article of food. According to the Chinese, it is an inhabitant of the canals."

(584) SANGUINOLARIA IRIDESCENS, Benson.

Testa subelliptica, compressa, albida, iridescente, versus apicem incarnata, exilissime transverse striata, striis obsoletis radiatim decussata; latere postico subrostrato, subangulato, antico longiore, rotundato.

This shell has a chatoyant reflection on the exterior of the valves, of which the substance is not in the least degree pearly. The rostrated end exhibits a faint trace of the fold which characterizes the *Tellina*.

"Found under the same circumstances as the last, and asserted to be an inhabitant of the canals."

(585) ARCA GALACETODES, Benson.

Testa subrhomboida, tumida, subæquilateraliter antice subangulata, postice rotundata, multiradiata, radiis exilissimis aucta, rugis decussantibus; cardine mediocri, terminis exterioribus angulatis; radiis lævibus remotiusculis, incurvatis; margine lævi; epidermide fusca. Lat. 0.5, poll.

This shell belongs to the sub-division of *Arca*, which contains the English marine species *A. lactea* and the Crag fossil *A. lactanea*, Wood. (Mag. Nat. Hist. Vol. IV. N. S. P. 232, Pl. Supp. No. 13, f. 3.)

It is sufficiently distinguished from both by its tumid form; its greater length, from beak to base, in comparison with its breadth, by the shortness of its cardinal line, and its more equilateral form. As in those species, the teeth are vertical at the centre of the hinge line, and inclined or radiate at the extremities. The lozenge-shaped space between the beaks is occupied by numerous raised lines, vertical to the hinge line, which are crossed again by faint depressed lines, affording a firmer hold to the ligament and performing the same office as the angulate concentric channels or scorings in *Rissoarea*.

"Found under the same circumstances as the last, and equally asserted by the Chinese to be an inhabitant of the canals."

(586) NOVACULINA CONSTRICTA, (Lamarck.)

Testa alba, tenui, transverse oblonga, læviuscula, extremitatibus rotundatis, radio mediano subconstricta; epidermide olivaceo-flavescente, postice quasi capillis intertextis adhærentibus vestita. Lat. 2.55, Long. 0.75, poll.

*Solen constrictus*, Lamarck, Vol. 5, p. 455.

This shell, which Lamarck, has described as *Solen constrictus*, and which on the authority of Peron, he considered to be from the Chinese or Japhanès Seas appears to have been a specimen of this shell, deprived of its epidermis. The terms in which Lamarck mentions its habits and the doubt whether it belonged to China or



## CHAMPA.

Japan, may well account for his describing it as a sea-shell. The places it immediately after the British marine species *solen antiquatus*, which approaches *Novaculina* in form and in its exerted medial beaks, though it differs in the number of the teeth. From *Novaculina gangetica*, (nobis), (Gleanings in Science, Vol. 2, p. 63, 1830, and Pl. v. fig. 4, vol. 1, and Sowerby's Manual, fig. 63,) to which it bears a near resemblance, it is well distinguished by the radiate depression which runs from the apex to the base of the shell, and which bears an appearance, as if a string had been tightly tied obliquely round the closed valves when in a soft state.

*Novaculina* now numbers five species, two of them American, two Chinese, viz *constricta* and *acutidens* (Sowerby, Broderip, Zool. Jour. Vol. iv. p. 361,) and the Indian *gangetica*, the species on which the genus was originally founded. Swainson has adopted it as a sub-genus of *Solen*. Gray's *Solen novaculina* (Griff. Cuvier, vol. 12, Pl. 31, fig. 1.) appears to represent an individual of *gangetica*, of which the teeth were injured. A dwarf variety of the latter shell occurs in the mud of the aqueducts in Calcutta.

(587) "*Novaculina constricta* was picked up among a number of other shells, thrown in a heap outside the kitchen door at the house of the first civil Mandarin of Ting-hae."

With reference to the foregoing descriptions, it is interesting to observe that several forms are absent which might have been expected to occur in the latitude of Chusan. Among the land Testacea, independently of the true *Limaces*, we may notice the want of *Pupa Vertigo*, *Carychium* and *Cyclostoma* which are met with in the temperate and warmer regions of Western Asia among rocks and under stones. We miss the more ventricose forms of *Bulimus* as well as of the genus *Achatina*. *Succinea* is also wanting, but occurs abundantly farther south, at Macao. Among the fresh water genera we miss *Ampullaria*, *Neritina* and *Navicella*, and among the Acephala, the genus *Psidium*. Moradabad, December 26th. 1841.—*In Journ. Ben. As. Soc.* No 247 of 1855.

(588) CHAMBOGUM, the Tamil name of a tree, the most beautiful in appearance on the coast of Malabar; it is a very close grained wood, and throws out rather a pleasant smell when cut. It is generally found in the forests of Travancore of about eighteen inches in diameter, and from twenty to twenty-five feet long; it produces a small round fruit which the natives use medicinally.—*Edye, M. and C.*

(589) CHAMPAH Upon the summit of the lofty hills, north of Khatmandoo grows the Champah, a tree which measures in girth eleven feet at least.—*Smith's Nepal.*

(590) CHAMPA, a province on the Peninsula of Cambodia. Mr. Crawford (Embassy to Siam) informs us that Champa before its subjugation by

## CHAUNA.

the Cochinchinese was a considerable state under a chief who lived at Phaurye, lat. 11° 10' North, that in the 15th century an intercourse subsisted with the Malays and Javanese, that the Queen of the principal sovereign of Java about the middle of the 15th century was a Champa princess, that the people are called Loe or Loi in the Anam language, and that they profess a species of Hindooism resembling the worship of Buddha or Jani.

### (591) CHANK SHELL.

Sungoo, TAM.	Shenkoo, TEL. and
Sunk, DUK.	SANS.

Of these shells, which are found in great abundance on the sea coast of the southern and western parts of the Peninsula of India, the natives make rings, beads, and other ornaments. They are also sent to Bengal and neighbouring countries where they are sold, and cut into cowries (small coin).—*Ainslie's Mat. Med.* p. 143.

(592) CHARI-MARAM, the wood called ebony in England. (See Ceylon woods, &c. named Achamarum, Nuga-gaha).—*Edye, M. and C.*

(593) CHARU, the Malayala name of a jungle-wood which grows to about forty feet high, and two feet in diameter. It is used in building native vessels, particularly for planks. It is not very durable, and is of little value except for those purposes. It is cheap, and is easily procured from the banks of the rivers.—*Edye, M. and C.*

(594) CHAUNA, the name of a wood which grows in Malabar. It resembles the English beach, and is used by the natives for housework. It is not durable, nor is it remarkable for its growth, quality, or use.—*Edye, M. and C.*

(595) CHAULMOOGRA SEEDS. These seeds are furnished by the *Chaulmoogra odorata*. Rox. or *Gynocardia odorata*. The plant is referred by Lindley to the Natural order Pangiacæ which by some is considered a section of Papayaceæ. The seeds are sold in the bazaars in India at about 13s. 4d. per cwt. The tree is poisonous but the seeds yield by expression a bland fixed oil having a peculiar smell and taste. The seeds are used by the natives of India in various cutaneous diseases. For this purpose they are beaten up with ghee or clarified butter and applied to the diseased cutaneous surface. The expressed oil is prized in the treatment of leprosy in India. The surfaces of the ulcers are dressed with the oil while a six grain pill of the seed is given three times a day. The dose of the latter is gradually increased to twice the original quantity. The expressed oil is sometimes given internally in doses of 5 or 6 minims. Too large doses are apt to produce nausea and vomiting. The Chaulmoogra is also prized by the Chinese *Notes on the Chaulmoogra seeds of India by Charles Murchison, M. D., M. R. C. P.* L. p. 353.

(596) **CHIRETTA**, on the varieties of Chiretta used in India. Dr. Hugh Cleghorn, M. D. Madras Medical Service, in writing remarks that he has frequently been struck with the evident dissimilarity between bundles of Chiretta, as received through the commissariat at different stations in the Madras Presidency, and although the stalk when chewed possessed the characteristic quality of pure bitterness and exhibited the many seeded capsule, the tetragonal stem and opposite sessile exstipulate leaves by which the Gentian family is recognised, he could not help thinking that the supplies furnished on indent contained several distinct plants. The collection of native drugs brought together at the time of the Madras Exhibition of 1855 furnished him with an opportunity of testing the accuracy of his previous opinion, and it occurred to him that a short notice of two distinct plants used in southern India might not be unacceptable. The properties of the Indian species of Gentianæ with the exception of two or three of the Himalayan ones, do not seem to have been at all investigated. After a diligent search in the medical literature of India, he could find not a single notice of their therapeutic action although the remarkable property of bitterness exists in the four general *Exacum*, *Ophelia* and *Adenema*, as well as in all the indigenous species which he had met with.—*Ed. New Phil. Mag. No. 6 of April 1856.*

(597) **CHECK**. Checks fit for children's dresses and gown pieces of great variety, the quality very good, the color tastefully distributed and the dyes excellent are made in the Madras Presidency.—*M. E. J. R.*

(598) **CHENTSU**. A tribe, one of the non-Arian races of India. Vocabularies of six of these, the Kondh, Savara, Gadaba, Yerukala, and Chentsu are given at p. 39, No. of 1856, of *Beng. As. Soc. Journal*.

(599) **CHERU-PUNA** in Tamil and Malayala, which is the small leaf poon. This wood is the real mast poon, which is preferred for the masts of ships or vessels. Peon, or Puna, consists of five sorts, all of which are similar in shape and growth; the largest sort is of a light bright colour, and may be had at Mangalore, from the forests of Corumcul, in Canara, where it grows to a length of one hundred and fifty feet. At Mangalore, Mr. Edye procured a tree of this sort that would have made a foremast for the *Leander*, sixty gun-ship, in one piece, for the sum of 1,300 rupees, or £149 sterling. Poon grows in the forests of Cochin and Travancore, but it is of a very inferior quality to that before stated; one sort is named the *Karapa Puna*, which is dark poon; and *Malai Puna*, meaning the hill poon; and another sort, the *Vellai Puna*, or the white poon; this sort is small, not more than twelve or eighteen inches in diameter, and eighteen or twenty feet long. In Canara, another sort, named *Merchie*

*Puna*, grows to twenty-eight inches or three feet in diameter, and from thirty to fifty feet long; and is very much like American birch. It is generally defective and not durable; consequently it is never brought from the hills, for, when felled, it opens and splits at the top and but for many feet in length. The weight of the poon may be said to be from forty to forty-eight pounds the cubic foot; but the lightest I have met with was thirty-four and three-quarters, and the heaviest fifty pounds, the cubic foot, when dry. The leaf of this tree is small and oval, about two by one and a half inches broad, and the fruit grows in bunches; it is about the size of coffee-berries; from this the natives extract oil, which is used for various native purposes.—*Edye, M. and C.*

#### (600) CH'HUTTEE.

Ch'huttee, HIND.

A Mahomedan rite, held on the sixth or seventh day of a woman's confinement.—*Herkl.*

#### (601) CHILLAH.

Chillah, HIND.

The fortieth day after child-birth, on which a Mahomedan woman performs her purifications.—*Herkl.*

(602) **CHILLOUNEA**. The Chillounea is a singular tree of Nepal. Its upper coat is entirely composed of innumerable needle-form fibres tolerably united by a kind of gelatinous sap. The wood makes good beams and rafters, and is held in such superstitious veneration by the natives, that no house is considered secure in which more or less of the timber has not been employed.—*Smith's Nepal.*

(603) **CHINA**. The great staff of life in China is rice, which is either eaten dry, or mixed with water, so as to resemble a soup. Out of rice they make their chief intoxicating liquor, which when good is something like strong whisky, both in its colourless appearance and its smoky flavour. Other vegetables are consumed such as the sweet potato, Barbadoes millet, peas, beans, turnips, carrots, &c. Of their fruits, the orange, lichee, loquat and mangoes are much in use. Their favourite animal food is pork, the taste for which is natural. There is a maxim prevalent among them, that "a scholar does not quit his books nor a poor man his pigs." The flesh of the bullock, sheep, deer, dog, cat and horse is eaten, but compared with that of swine, it is a rarity. Fish are eaten in great abundance, either fresh, dried or salted, and they rear great quantities of ducks and various species of fowl for the table. The comprehensive principle on which Chinese diet is regulated, is to eat everything which can possibly give nourishment. The luxuries consumed by the rich consist of the edible birds nest, the bech de mer or sea slug; shark fins, fish maws, cow sinews, points of stag antlers, buffalo hides, which afford the gelatinous foods considered so restorative.



## CHROME ORE.

Amongst their delicacies also, are dishes made of the larvæ of the sphinx moth, and of a grub bred in the sugar cane.

(604) CHINNIE MARUM. Chini in Tamil, Kasawha in Malayala. This is a tree which grows to about eighteen inches in diameter, and twelve feet long; it is heavy and close grained; it produces a small berry much like pepper, which, as well as the wood, is not of much use.—*Edye, M. and C.*

(605) CHIRONIA CENTAUROIDES. Nat. ord. Gentianacæ. Nyè, Hind. This plant is found in some parts of India.

(606) CHLORINE. (Solution of). To prepare this, take Muriate of soda sixty grains, sulphuric acid two fluid drachms, red oxide of lead three hundred and fifty grains, water eight fluid ounces. For this beautiful, and in India most useful process, Dr. O'Shaughnessy was indebted to the Edinburgh Pharmacopœia. It supercedes the use of manganese, which in India can only be procured from European druggists. It is used for bleaching, also for inhalation, and for the fumigation of infected apartments.—*Beng. Phar. p. 369.*

(607) CHOUGH, the Chough, or 'Cornish Chough' as it is often called (*Fregilus graculus*), an inhabitant of the more elevated regions of the Himalaya and of all high middle Asia, is stated to have been obtained "in the vicinity of Calcutta."—*Cul. Rev.*

(608) CHOUTAL, the Malayala name of a tree that grows to about forty feet in height, and eighteen inches in diameter. It is a wood which the native coopers use in preference to the woods of the country for casks, vats, tubs, &c.—*Edye, M. and C.*

(609) CHOOTRAPHUL. The Chootraphul is a Nepaul tree, not unlike the barberry in appearance; the wood is of a strong yellow colour, but does not afford a permanent dye; the women of Nepaul use it instead of sandal for tracing the tillah on their forehead.—*Smith's Nepaul.*

(610) CHROME ORE. Very good samples of the Chromate of Iron were exhibited at the Madras Exhibition of 1859 from Salem, Vizianagarum and Bangalore, but as yet nothing has been done to turn this mineral to useful account on a large scale in India, from the want of proper appliances. The great consumption of this substance in Europe is in the manufacture of Bichromate of Potash for dyes, the chromates of Lead for painting, and chromic acid for coloring pottery, porcelain and glass. The mineral was carefully tested some years ago and a few ounces of the Bichromate of potash and the yellow and orange Chromates of Lead were made in the School of Arts Madras. The supply of Chrome Ore in Salem is said to be abundant, but the raw material will not pay the expense of freight, though the Chromates of potash and Lead might be brought into use in dyeing

## CINCHONA.

and painting if carefully manufactured in India. The Chrome ores used in England are obtained from the Shetland islands and Styria where they are abundant. The quantity required for manufacturing purposes is not very large, hence the raw ores of India could never be brought into the English market so as to prove remunerative.—*M. E. J. R.*

(611) CHRYSANTHEMUM INDICUM. Indian Chrysanthemum. Hind. Gool-daoodi. Yellow and white varieties are common.—*Gen. Med. Top. p. 206.*

(612) CHRYSOPRASE (from χρυσος golden or beautiful, and "υπασον" a leek) is a rare apple-green calcedony, which owes its colour to the presence of the metal nickel.

(613) CHURNUS, called momea, in Nepaul, from its resemblance to wax, burns with a clear bright flame.—*Smith's Nepaul.*

(614) CINCHONA. The official report of the cultivation of the Cinchona tree in Java has reached Calcutta, and is about to be translated for the use of Government. The success of this important experiment is stated to have been complete, and Java may in a few years furnish a large supply of quinine to India as well as to Europe. The cultivation had proved successful, the authority being an official statement to the Dutch Government on the subject, a translation of which was kindly put in our way.—*Englishman Newspaper, Calcutta.*

When it is recollected that Dr. Weddel discovered the Cinchona Calisaye, yielding the invaluable yellow bark of English commerce, flourishing abundantly in the Cinchona regions of Bolivia and a part of Peru, between 19° and 13° of South latitude; and that the corresponding parallels of the Eastern hemisphere include the Neilgherries, and that great chain of hills which extends from Munneepore to Cape Negrais, many of whose rocky peaks and platforms rise to an elevation of at least 5,000 feet, when, further, it is borne in mind that the Coffee, a plant nearly allied to the Cinchonacæ, is apparently indigenous to a portion of the latter range; that, as shown by Dr. Falconer, two trees very nearly allied to the true barks, the Hymenodiction excelsum and the Lucalia gratissima are native in India, the latter growing abundantly in Sylhet at the foot of the Kossyah Hills; and also when it is recollected that the rocky nature of the soils; and the hygrometric condition of the atmosphere in many of these situations appear very closely to approach those of the tracts in which the Cinchonacæ thrive best;—it can scarcely be doubted that the experiment of introducing it into India, might be tried again, with every prospect of success.

The two genera in India closely allied to Cinchona, and which were formerly described by Botanists as species of that genus are, the one Hymenodicyton, species H. excelsum (Cinchona

excelsa of Roxburgh) growing in the hilly parts of India to the size of a large tree, and yielding a bark which is very bitter and tonic, and acts as a febrifuge, although not known to yield any alkaloid like quinine. Another, *Lucalia*, yields a species, *L. gratissima* (*Cinchona gratissima* of Wailich), growing abundantly in Sylhet. It forms a small elegant tree, and is very nearly allied to *Cinchona*, but it is not known to possess any energetic medicinal properties.

One South American species, introduced within the last two years, is now growing in the Honorable Company's Botanic Garden Calcutta. It is the *Cinchona* (*Remigia*) *ferruginea*, from the dry mountains of the province of Mines in Brazil. It yields the "Quina de Serra" or Quina de Remigo, which is substituted as a febrifuge for true *Cinchona* bark in Brazil.

The species most desirable for introduction into India are,

*Cinchona Condaminea*.

*C. Mierantha*, before all others and then,

*C. Nitida*,

*C. Lancifolia*,

*C. Lucumæfolia*,

*C. Ovata*,

*C. Lanceolata*,

*C. Dubescens*.

*C. Cordifolia*,

*C. Magnifolia*.

*Indi. Anna. Medi. Science*, page 252 and 259.

(615) CINNAMON. The attention of agriculturists and others having of late been called to the cultivation of cinnamon in the straits, consequent on the favorable result of the experiments made by Mr. Ferrier at Malacca, as published in the "Singapore Free Press" of the 19th September last, the following hints and suggestions as to the mode of cultivation and preparation of the spice may not prove unacceptable to intending planters.

That the soil and climate of the straits settlements is suitable for the growth of cinnamon there can be little doubt, for it seems to be generally admitted that it has for years been grown at all three, but no advantage has been taken of the fact, simply perhaps from the circumstance of no one's knowing how to do so.

Cinnamon after the attainment of several years of age, blossoms about the month of May, the fruit ripens about the month of August,—when ripe it is of a purple color.

**Seeds.** Should it be desirable to preserve the seeds, which can be done for some months without injury, they are cleaned of the pulpy skin in which they are enclosed, in the following mode.—Keep them in a chatty or other similar vessel, for a few days, when the skin will have rotted and decomposed to such an extent as to be easily removed, put them into a bucket, pour cold water upon them, and by stirring them about the decomposed pulp will be easily washed off,

spread them out on a mat in a shed to dry, but they must not be exposed to the sun, as they will split, and thus be rendered useless. It is not necessary however that this process should be followed previous to planting, as seeds planted with the skin on them grow admirably, provided they be planted at once.

**Nursery** For the formation of a nursery, the seeds should be put into the ground at 6 inches apart, and at from 2 to 4 months growth they can be shifted into the plantation, where they ought to be planted at a distance of at least 10 feet.

For the first cutting when the tree is three years is the usual time. At first the young tree will present one or two stems for peeling, these are to be cut off at about 6 inches from the root, when the next year the number of stems may be doubled, and so on for some years. Care must be taken to bank up the young shoots, to prevent their being broken off at the root either by getting top heavy or gusts of wind, whilst all weak and small branches ought to be carefully cut off, as useless themselves, they only tend to weaken the main stem. Cinnamon for peeling ought not to be allowed to grow up to standard trees, but kept continually in the bushy state.

The proper season for cutting is when the fruit has ripened, and after a shower of rain,—for this reason, I presume, that the bark is more easily peeled, when cut the branches should not be allowed to dry, but ought to be peeled forthwith and on the spot, for if allowed to dry there is great difficulty in separating the bark from the wood, and to enable that to be done, it is sometimes requisite to beat the branch with the haft of the knife, which contuses the bark and injures the peelings. Peeling is done with a knife, by making 2, 3, or 4 incisions in the bark length-ways in such lengths as the knots of the branches will admit, and then gently easing off the bark with the same implement, care being taken not to break or cut it in any way—it is a simple process, and easily learnt. After peeling, the bark is to be scraped, which is done with the circular knife, by placing the bark on a smooth round stick, for instance a Malacca cane, and scraping it till the whole of the epidermis is taken off, it is then to be spread out on a mat to be dried, but not to be put in the sun. It will then of itself roll up, and take the shape designated quills,—it is then to be sorted into Nos. 1, 2, 3. No. 1 is distinguished by brightness of color, delicacy of flavor, and thinness of skin, and is to be found in the bark of the middle of the branch, whilst No. 2 is to be found at the upper end, and No. 3 at the lower end of the branch. When sorted, the quills are laid up in lengths of 4 feet, made up in a way similar to that in which a cigar is, viz., all the small pieces put inside the finest and longest bits of



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bark that can be got, and which are joined the one to the other, till the length of 4 feet is attained. After the quills have thus been laid up, they are exposed on a mat in the sun for a couple of days to dry. Five days are generally required from the cutting to complete the curing, till ready for packing. The quills are tied up into convenient bales, sewed up in gunny bags, with round black pepper sprinkled amongst the cinnamon, to preserve its flavor.

*Oil.* A very excellent and valuable oil can be extracted from the coarse bark of the cinnamon, one very like that of cloves can be distilled from its leaves, camphor of good quality is procured from its roots, its branches are excellent fire wood, and old timber is valuable for casks for the exportation of arrack, as it is said to impart a fine flavour to the spirit, and Ceylon arrack fetches a higher price in the European market in consequence.

J. FERRIER.

*Malacca, 27th September, 1851.*

*Cultivation.* It appears from experience that the soil of Ceylon is more favourable to the growth of Cinnamon, than to that of any other aromatic plant, and the climate of Ceylon, if at all, differs but in a very slight degree from that of the Straits. The spice if cultivated in the Straits, will it is supposed, prove superior to that of Ceylon, if one may judge from the various spices that grow there almost wild, and it would moreover yield a better return than in Ceylon. This supposition is confirmed from having seen the spice which was prepared in 1850, in Pringet, by the Honorable Resident Councillor of Malacca, and which was found to be equally as good in every respect as that grown and cultivated in the Maritime Provinces in Ceylon.

A sandy soil is that which is generally selected for cinnamon, but other soils may be chosen, also, such as a mixture of sandy with red soil, from quartz, gravel or rock, also red and dark brown soils. Such land, in a flat country, is preferable to hilly spots, upon which, however, cinnamon also grows, and even abundantly, such for instance as the hills of Ceylon which are known by the name of the "Kandyan Mountains." The soil that is rocky and stony under the surface is bad and not adapted for the cultivation of cinnamon, as the trees would neither grow fast, nor yield a remunerative return.

When a tract of land of the above description is selected, the whole of the ground should be cleared, leaving a few trees for shade, to which the labourers might return for rest and relaxation: these may be from 50 to 60 feet apart. The trees felled should be well lopped, burnt and cleared away, the stumps should be removed with the roots after which they may be allowed to remain, in order to save expence of carriage, merely by observing some degree of order in the disposition, by forming regular rows, of which the interven-

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ing spaces are planted with cinnamon. The ground being thus cleared, holes may be dug at 8 to 10 feet apart, and of one foot square; the distance from each plant will depend upon the nature of the soil, that is, the poorer the soil the nearer to each other should be the trees planted, and *vice versa*.

When this operation is over should the holes be intended for cinnamon roots, or stumps, the latter must be carefully removed with as much earth as can be carried up with them and placed in the holes, taking care not to return the earth removed originally in digging the holes, which are to be filled with the soil scraped from the surface, which has been previously burnt, exposed, and formed into manure. Should no rain have fallen after the placing of the roots in the holes the stumps should be well covered, and watered morning and evening until such time as the sprouts shoot out fresh buds, which will be in a fortnight or so from the time they were transplanted, when the watering may be discontinued. In a month, the new shoots will be 3 or 4 inches high,—this much depends upon the weather.

If the holes be intended for young plants or seedlings, the plants must be removed with boles of earth from the nurseries, and placed in the holes, taking the same care as with the stumps, both in watering and covering, in the event of its being dry weather. When the seedlings take root, the coverings should not be removed until the plants throw out a new pair of leaves from the buds, which is a sign of their having taken root.

When a plantation is formed of old stumps all the branches should be cut down within 6 inches from the ground;—this should be done with one stroke of a sharp instrument in order to avoid the splitting of the stem. From these stumps cinnamon may be cut and peeled within 18 months from the time of transplanting. Often this is done after the lapse of 12 months from the time of transplanting.

From seedlings one cannot expect to gather a crop before 2 or 3 years from the time the plants were transplanted, when there will be but one or a single tree, which when cut down as already shown 4 or 6 inches to the ground, ought to be covered with fresh earth gathered from the space between the rows, and formed in a heap round the plant. The next crop will be 3 or 4 times as much as the first, from the number of sprouts the stem will throw out, and so on every year, the crop increasing according to the number of sprouts each stem will throw out yearly from the cuttings. In the course of 7 or 8 years, the space left between the rows will only admit the peelers and others to go round the bushes to weed, clear and remove cuttings; as the branches from each bush will almost touch each other at their ends.

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It is essentially necessary to take every care not to allow any creepers or other weeds to grow, the former interfere with the growth of the bushes by entangling because it not only takes out so much of the soil feeding the cinnamon trees, but interferes with the peelers during the cutting season and prevents the branches growing up straight with a free circulation of the air. The plantation ought to be kept clean and free from weeds, the cinnamon requires no manuring, but when the plantation is weeding the bushes should be covered with the surface soil and raising the ground round the bush by making a heap of the earth, which answers well in lieu of manure. This operation must be attended to as soon as the cinnamon sticks be removed for peeling. The plantation requires weeding 3 or 4 times a year during the first 2 or 3 years, then twice a year will answer the purpose as by that time the trees will form into bushes and destroy the seeds of the weeds on the ground.

**Nursery.** The forming of a nursery is necessary, for which a space of ground say an acre, should be selected in a rich bit of soil, free from stones. Clear the whole brushwood, only leaving the large trees for shade, remove all stones, stumps and roots, dig the place well 6 or 8 inches deep, then form into long beds of 3 or 4 feet wide, put the seeds down 9 or 12 inches apart, cover them 8 or 12 inches above the ground by a platform, and water them every other day until the seeds grow up and give one pair of leaves—then leave off watering (unless great dry weather—when it ought to be continued) but not uncover until the plants grow up 6 or 8 inches high, can bear the sun, and these seedlings will be ready for transplanting after three months from the time they were sown.

The forming of nurseries is done at the close of the year before December. When this is to be done first the party commences clearing and preparing the land during the dry season which is from the beginning of December up to end of March following. April will set in with heavy rain (it is generally so in Ceylon) and will continue wet weather till the end of August and very often till September and October, and have the benefit of 4 or 5 months rain.

The cinnamon seeds are to be gathered when they are fully ripe, they must be heaped up in a shady place, to have the outside red pulp rotted, when it turns quite black, then have the seeds trampled or otherwise freed from the decomposed pulp, uninjuring the seeds, and have them well washed in water, (just as done to cherry coffee, before they are made into parchment in the white shell) and have the seeds well dried in the air, without exposing them to the sun, and then put them in on the ground prepared for their reception. If cinnamon seeds after washing be exposed to the sun even for twenty minutes, the shells will crack into two and

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destroy the seeds from growing. In washing the seeds those that float on the surface should be rejected.

There are five different sorts of cinnamon, viz:—

1st is called Panny Meeris Caruudoo.

2nd „ „ Tittha ... „

3rd „ „ Kahatte ^ ... „

4th „ „ Wallee ... „

5th „ „ Savell ... „

Of these, the first kind is the best of all: the 2nd and 3rd although inferior, are peeled likewise, the 4th and 5th are spurious.

The distinction in the cinnamon can be known both by taste, and the shape of the leaves on the tree, and an experienced “Chaliya” man will judge the quality of cinnamon by first sight.

The quality of the bark depends upon its situation in the branch, that peeled from the middle of the bush or branch, being the *most superior* or 1st sort, that taken from the upper end is the 2nd quality, while the bark removed from the base of the branch, or the thickest end, is the most inferior and called the 3rd sort.

From the cinnamon bark refused in the sorting store of all kinds, in separating the first, second and third qualities and in making up into bales for exportation, the refuse is collected, and by the chemical process, cinnamon oil is extracted, which sells very high, with an export duty of 3s. or 1½ rupees on each ounce, exclusive of the British duties payable in England for importation, which in 1851, were one shilling and three pence per ounce. No export duties exist in the Straits settlements.

From the cinnamon leaves, a liquid is extracted in the same manner, which goes by the name of “clove oil,” and is sold for a little less than cinnamon oil, with a duty I believe as on cinnamon oil.

Of the cinnamon roots camphor is made, and sells well both in Ceylon and other parts of the world by exportation.

Return of cinnamon exported from Ceylon for ten years, shewing the quantity and value for each year.

Year.	Quantity.	Value.
1841	317,919	£24,857
1842	121,145	15,207
1843	662,704	66,270
1844	1,057,841	105,784
1845	405,669	40,821
1846	401,656	40,165
1847	447,369	44,836
1848	421,687	49,168
1849	733,755	73,378
1850	644,857	64,485

**Duties.** After the monopoly was abolished by government in 1834, the dealers in cinnamon had to pay 8 shillings per lb., for every lb. exported from Ceylon. From the 1st June 1842, this duty was reduced to two shillings per lb. on



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the 1st and 2nd quality, and one shilling per lb. on the 3rd quality.

Upon representation of this still heavy duty on cinnamon by the Chamber of Commerce, it was again reduced from 12th September 1848 to 2d. per lb. on the 1st and 2nd quality, and 4 pence on the 3rd quality, and continues to be so.

During the existence of monopoly and *Raja-kariye* (compulsory labour) each *choliya man* (cinnamon peeler by caste and birth) was bound to supply the government store with 60 lbs., on pain of corporal punishment and hard labour, for 3 months during the year, gathering the spice either from the government plantations or private property, but since the monopoly was abolished every cinnamon peeler receives remuneration upon the quantity of cinnamon he peels on his own account for sale to the highest bidder, and with the assistance of his family, he can prepare 3 or 4 lb. of cinnamon per day during the gathering season. **TIKERY B. DUNDEWELLE**, *Malacca, August, 1851, in No. XI, Vol. V, Journal Ind. Arch. Nov. 1851.*

### (616) CIRCUMCISION.

**Khutna**, ARAB. | **Soontan**, HIND.

Among Mahomedans, this rite is directed to be performed between the age of seven and fourteen years though occasionally it is done either before or after that period.—*Herk.*

### (617) CLEMATIS. L. Polyandria Polyginia.

ORDER I. RANUNCULACEÆ, D. C. *Prod. I. p. 2.*

THE CROW-FOOT TRIBE, LIND. *Nat. Syst. p. 6.*

SUB-TRIBE I. Clematidæ D. C. *Prod. I. p. 2.*

**Klema.** A shoot, tendril; climbs like the vine. *Lam t. 497 Gaert t 74.*

### (618) CLEMATIS GOURIANIA W. &

A 2 D. C. triloba W. & A. 2 D. C. *Syst. I. p. 138* Wight's illust;—No. I. p. 2.

**Moriel.** Indian Traveller's joy; Scandent, perennial;—flowers after the rains, on the Ghauts, and in various parts of the Deekan.

"In the environs of the ancient city of Gour, it forms with *Porana paniculata*, extensive lovely festoons.—*Rox. Flora 2, p. 671. Gr. Cat. No. 1, p. 1.*

### (619) CLEMATIS WIGHTIANA. W. &

A. 3. Scandent, perennial with very soft villous leaves, coarsely serrated. It is also called *Moriel*, and grows common at Mahableschwur, and the adjoining Ghauts, flowering after the rains. *Wallich's C. grata* Asiatic Pl. t 98, much resembles it and is perhaps identical

Hedges and thickets where these plants grow have the appearance of being covered with hoar frost, from the white feathery tails of the seeds. They are very ornamental and worthy of a place in Gardens.—*Gr. Cat., No. 2, p. 1.*

### (620) CLEOME. Some species of *Cleome*

have an acrid taste, which has been compared by many, to mustard. The leaves and succulent stems of *Polanisia* (*Cleome*) *icosandra*, applied to the skin, excite inflammation, and are sometimes employed as a sinapism: in this coun-

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try, the seed are administered as a carminative and vermifuge. The leaves of *Gynandropsis* (*Cleome*) *pentaphylla* bruised, and applied to the skin, act as a rubefacient, and produce very abundant serous exudations affording in many cases the relief derived from a blister without its inconveniences. This freedom from inconvenience is not however always experienced. Dr. Wight once saw extensive vesication produced by the application of the leaves of this plant, as a discutient, to an incipient boil. The previously existing inflammation of the skin probably gave rise to this extensive action.—*Wight's Illustrations of Indian Botany, Vol. 1, p.p. 34-35.*

### (621) CLEOME VISCOSA.

**Aria veela** RHEED Mal.

ix. t. 23.

**Hoor hooria**, BENG.

**Kuka wominta**, TELING.

**Viscid cleome** (seeds)

ENG.

**Cleome**, FR.

**Cleome Klebrige**, GER.

**Hindaule**, PERS.

**Hoolhool, caraila**, HIND.

and Cashm.

**Nahivaylee**, TAM.

**Svana burbaara**, SANS.

Annual, a native of cultivated lands. It is more upright, and less ramous than another species, and from one to three feet high. This species has a considerable degree of pungency in the taste, but it is not durable on the tongue. The seeds are much used by the natives, chiefly the brahmins, in their curries, they are sold in all the bazars, at a very trifling price. *Roxburgh's Flora Indica. Vol. 3. p. 128.* Ainslie says this is a low growing plant, of the class *Tetradynamia*; and order *Siliquosa*; the small, hottish tasted seeds of which have got the name of *Nahi Kuddaghoo*, or Dog's Mustard; they are considered by the Native Practitioners as anthelmintic and carminative. In *Dukhanie* the seeds are called *Chorie ajooan*, and in Arabic *Buzrool bunge ahemur*.—*Ainslie's Materia Medica, Vol. 1, p. 92.*

(622) COAL. Deposits of Coal have been found along the Siamese Coast from Pinang to the vicinity of Junk Ceylon. In 1836, specimens of Coal were brought from Trang, one of the lower provinces of Siam, and subsequently a deposit was discovered at Tama, not Gurbie. Coal was found at Sungei-Kamuning, about sixteen miles above Trang, and at a place, also, nearly east of Pulo Mutiara or Pearl Island about 12 miles to the southward of S. Kamuning. It was also found at the Pulo Tiga island, lying off Purlis, on the coast of Keddah, but although this coal lies about thirty miles further south than the Trang coast coal, or rather S. Kamuning, Colonel Low was inclined to believe them to be of the same coal field. Another coal was found in the bay north of Tanjong Bumbong on the coast of Trang, betwixt the last place and Kamuning.

The discovery of coal in Ligor and Kedah on the west coast of the Malay Peninsula was brought to the notice of the Court of Directors in 1847. It is identical in composition, in the

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proportion of volatile matter to charcoal, with some kinds of Cannel coal. Sp. Gr. 1.245,—Volatile matter, 46.746 ;—charcoal 52.071 ; Ash, 1.183=100. That found on the Southern coast of the island of Junk-Ceylon, (well known for its tin) and which occurs near the bank of a river and about two or three hundred feet from its mouth, was reported by Professor Ansted as adapted for every purpose to which coal is economically applied

	Sp. Gr.	In 100 parts.		
		Volatile matter.	Coke	Ash.
Junk Ceylon Coal	1.25	60.40	39.58	2.50
English Cannel Coal	1.27	60.00	40.00	0.30

The position indicated as a deposit of Coal, is in Lat. 7° 44' N. and Lon. 99° 15' E. the Southern point of Pulo Lontar bearing S. W. by S. Telebon S. S. E. and Tanjong Cotton N. E. by N. Some of it takes on the polish of fine jet. The Ligor specimens of this jet are the best.

Coal is found at Rettie on the South East coast of Sumatra, which bears a strong resemblance to that from Junk-Ceylon, sp. gr. 1.23,—Volatile matter 51.43. Charcoal 48.57. Ash not determined.

In Borneo, Coal is associated at *Pulo chir-min*, which is about 200 feet high, with a ferruginous sandstone, and overlaid by a mass of red sand and clay. At *Pulo kang Arang*, again, the coal is overlaid by white sand stone.—*Colonel Low, No. 3. Journ. Ind. Arch.*

(623) COCHIN CHINA. The Government of Cochin China is a pure despotism, the power of the king being absolute and without restriction. There are two classes of mandarins, the Civil and Military but for the administration of the affairs of the Government there are 6 departments or ministers who are termed Luc-bo, whose occupancy of power does not extend beyond three or four years. The laws and modes of punishment of the Cochin Chinese are nearly the same as those of China. Their language termed the "*Anamite*" is monosyllabic and evidently derived from that of China. Their written language indeed is merely borrowed in whole or in part from the Chinese, though the two languages have become so different that persons of the two nations cannot communicate either in reading or writing. Chinese however is the learned language of Cochin China with the pronunciation of the Cochin Chinese. The Anamite language from its monosyllabic character, presents but a small variety in the sound of the words, and a great number of significations, all indicated by the tone, are given to words spelled alike. The religion of the learned men is not well known, though they honour Confucius, that of the common people is the religion of Fo which they

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call Phat, but the people readily embrace Christianity and there were at least 440,000 Christians, when Dr. Le Fevre wrote in 1846.—*No. 3 Journ. Ind. Arch.*

(624) COCHINEAL. This insect was introduced into Java a few years ago, as a Government experiment, and apparently with more success in its production than in British India; for as long ago as 1844 it was exported from Batavia to the estimated value of 93,319 guilders.—*Crusford's Des. Dic. of the Indian Islands. p. 112.*

(625) COCOS NUCIFERA, Coconut tree.  
*The Tree*

Tenna marum, TAM. | Tenkoi chettoo, TEL.  
Narrel ka jhar HIND. | Kinghena, CAN.

This tree thrives well on the sea coast, its uses and produce are well known, the wood is occasionally used for reapers, &c., for which purposes it is inferior to the palmyra. In Ceylon, however, and on the Western Coast hard and durable rafters are procurable, the Cochin planks are prettily striped and of remarkable size.—*M. E. J. R.*

*The oil.*

Tenkaya nuna, TEL. | Thanga yennai, TAM.  
Narrel ka tel, HIND. | Coconut oil, ENG.

The genus Cocos, has many species, but no other of them is of so much importance to man as the Cocos nucifera. The C. butyracea a native of New Grenada and Venezuela might, however, be advantageously introduced into India. The Cocos nucifera, is found everywhere, even in uninhabited islands, in all tropical countries, and to the height of 1,000 feet above the sea though flourishing in greatest luxuriance in the vicinity of the ocean. It rises sixty to a hundred feet high, its cylindrical trunk, crowned with numerous waving, feathery leaves, forming an elegant object of intertropical scenery. It is one of the most useful of the palms and its various products are as variedly employed being fabricated into innumerable materials for domestic use and employed in commerce. It may perhaps enable an estimate to be formed of the value of this palm by furnishing the following statement of the exports, and imports from and into India of the products of the coconut palm, during the year 1850-51.

Exports from	Coco-nuts. Rs.	Shells Rs.	Kernels. Rs.	Oil. Rs.	Coir and Coir Rope. Rs.	Cand- jans. Rs.
Calcutta.	—	—	—	6,891	18,009	—
Madras.	10,140	—	431,008	144,952	246,852	—
Bombay.	—	—	—	—	5,705	—
	10,140	—	431,008	144,952	270,566	—
Imports into						
Calcutta.	149,646	5,970	176,398	231	56,542	—
Madras.	—	—	—	—	—	—
Bombay.	375,243	—	489,722	76,417	175,392	2,090
	524,889	5,970	866,120	76,648	231,934	2,090



Several varieties of the Coconut Palm are cultivated in India, but the fruit known as the double coconut of the Seychelle Islands does not belong to this. The fruit, or coconut, when fully ripe, can be hollowed and cleaned, by being filled with salt-water and buried for some time in the sand, when the albumen decays, and is washed out.

The nuts are made into goblets and cups and when mounted with silver, polished and carved, are very handsome; but for every day household use, they are made into lamps, ladles, skimmers, and spoons. The shells make good lamp-black and when reduced to charcoal and pulverised, an excellent dentifrice. It is from the husk of the coconut, that the fibres, so well known as coir, are prepared. The coconuts are used as offerings for idols.

The fruit bearing power of the coconut palm may be considerably improved by extracting toddy from the blossom shoots for the manufacture of jaggery during the first two years of its productiveness, after which it may be discontinued. The subsequent annual produce may be safely reckoned at fifty nuts per annum.

This fruit is a valuable product of the tree, as from ten to twelve large nuts, besides several small unproductive ones, may be seen on each bunch. In good situations, the fruit is gathered four or five times in the course of the year. The albuminous substance within the Kernel is used as an article of food and when dried is largely exported to other places as the "copra" of commerce, and the clear sweet liquid which it encloses when young is a very agreeable drink. It is indeed the albumen, in a liquid state. In Ceylon, house plasterers attribute an adhesive quality to this water of the green nut, and mix it with their white and other washes, in which lime forms a chief ingredient.

The shells of the green nuts, fixed on stakes, are used as illumination lamps.

The full ripe nut contains a small quantity of oily milk and is then used for making oil. Coconut milk is extracted by pressure and is used in making curries &c. It is from the husk of the coconut that the well known "Coir" khor, khair or roya of commerce is prepared.

Coconut husk, from which the fibres have not been separated, is used in the east in lieu of scrubbing brushes for the floor, and for polishing wood; brooms, mats and bags are likewise manufactured from it.

Coconut oil, becomes solid at about 70° Fahrenheit; it is one of the fixed or fatty oils, and consists of solid and fluid constituents: the latter or Oleine, being separated by pressure from the solid parts, called stearine or by others Coein, so largely used in the manufacture of the Stearic candles by Mr. Wilson of Vauxhall. The imports of coconut oil into England, was in 1853, 464,196 cwt. most of which was the pro-

duce of India, and in the year 1850-51, 649,152 gallons of the oil were exported from Malabar alone, principally to the Mauritius, Britain and Bombay.

Coconuts are made into hookahs, and Porcupine wood, is the name given in Europe to the timber of the coconut.

*Coir.* The rind or husk of the coconut is very fibrous and the fibres, when separated from the ripe nut, is the Roy or Coir or khair of commerce, now so extensively used for ropes, cables, matting, stair carpets, rugs, door matting, netting for sheep folds, brushes, hats, bonnets, coarse sail cloth, gunney, as a substitute for hair, for stuffing mattresses, cushions, couches and saddles; as a substitute for bristles for making brushes and brooms. The nut cut transversely is used for scrubbing floors and polishing furniture. It may give some idea of the value of this material to mention that in the three years, 1847-48 to 1849-50, coir and coir rope were imported into Calcutta, Madras and Bombay to the value of Rs. 8,81,537, more than the half of which was the produce of British India alone. The principal use to which the coir is put, however, is in the manufacture of cordage. There are different modes of preparing the fibre; the most common being to soak the nuts for many months in water, or to bury them in the sand of the sea shore. In the Laccadives, the nuts are cut about the tenth month. If cut before this the coir is weak, and if allowed to become quite ripe, the husk gets hard and woody. When cut the husk is separated from the nut, and thrown for about a year into soaking pits, which are merely holes in the sand, just within the influence of the salt water, or into fresh water tanks: but in the latter, as the water is not changed, it becomes foul and dark coloured, and affects the colour of the coir. If taken from the pits too early, it is difficult to free the coir from impurities, and if left in too long, the fibre is weakened, a result what is said also to occur in the fresh water steeping. At Calpentyra and the Akkara puttoo in Ceylon the natives separate the coir by burying the husks for six months along the border of the salt water lake, and they are dug out very clean, this mode being free from the offensive smell which arises from the fresh water steeping. When soaked sufficiently long it is washed and well beaten with heavy mallets, and then laid in the sun to dry. This being effected it is again well beaten, until the fibres are so separated as to allow of their being worked up like hemp, similar to which it is made up into cordage of any size, from the smallest ropes to the largest cable. It is said that it will not receive tar or tan, but this is doubtful. It is rough to handle, and has not so neat an appearance about the rigging of shipping as that made from hemp, but surpasses the latter in lightness

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and elasticity, and even it is said durability; more so if wetted with salt water. From its elasticity it is valuable as cables enabling a ship to ride easier than with a hemp or chain cable. Also well suited for the running ropes of the higher sails; and the only thing to be guarded against is to prevent the sails being chafed by its rough fibres. The coir made from the husk of the nut, is calculated to realize nearly one-fourth of the proceeds of the oil. Forty cocoanuts are said to yield 6lb. of coir in Ceylon, but Mr. Robinson is quoted by Dr. Royle as stating that three large coast nuts will yield 1lb. of coir, measuring 22 fathoms; whereas ten small fine island nuts go to about 1lb. of coir, measuring 35 fathoms. A Mangalore kandy of 560 lbs. will thus be the produce of 5,600 nuts, and should contain about 20,000 fathoms of yarn.

Coir and coir rope is a considerable article of export from the Madras Presidency, and has been increasing of late years.

Years.	Hemp. Rs.	Coir and Coir Rope,	Total. Rs.
1847-48	19,819	27,937	47,756
48-49	23,242	1,38,617	161,859
49-50	23,076	2,08,704	231,770
50-51	10,577	2,46,852	257,429
51-52	46,683	2,42,019	288,702
52-53			
53-54			
54-55			

The value of the coir produce of a tree is calculated at from two to two and a half annas. The best Kiltan and Chetlat coir of the Laccadives is purchased by government at Rs. 20-12-7, per candy, or Rs. 23-12, per Calicut candy.

The net-like substance Peynadi, Tamul, "Jalla Mitta" Hind., at the base of the petiole, when very young, is delicate, beautifully white, and transparent; but when it attains maturity, becomes coarse and tough, and changes to a brown colour. Portions of these are everywhere used as strainers and sieves, for straining fluids, sifting arrowroot &c. and the Tahitian fisherman convert it into a garment, when fishing.

The flowers contain a powerfully astringent property, used medicinally and it is from the flower and spathes, before the flower has expanded, that the toddy or palm wine of this tree is obtained.

The wood is applied to various purposes, such as rafters, fences, shears, laths, shingles, chairs, and ladies' work-boxes, &c., but during the period of its most abundant bearing, (considered to be between ten and thirty-five years growth), the heart wood is of so soft and spongy a nature, that it is merely used for fences, water pipes, &c.

The Tahitians extract a gummy substance, called Pia-Pia, from the trunk of the tree.

Combs of a neat appearance are made of the

## COFFEE.

mid-rib of the segments of the leaves, and the mid-ribs when tied together, form brooms for the decks of ships: the unexpanded leaves are employed to form arches during festivals.

The leaves are from eighteen to twenty feet long; and when split into halves are plaited into screens, floor mats and baskets. Under the name of cadjans, they are employed to cover houses. The heart or very young leaves, called the "cabbage," is an excellent vegetable, though rarely used as such, as the tree dies on its being removed. The old dried leaves and the spathe are used as torches.

The uppermost and tender shoots of the coconut tree when boiled eat like cabbage and are much prized both by Europeans and Natives.—*Ainslie, p. 245. Seeman. M. E. J. R. Royle.*

(626) COFFEE. *Coffee planting in Ceylon, By C. R. Rigg, Esq.* The high prices of Ceylon Coffee in the home markets, and the reputed fertility of the "Pendant jewel of India," as Lankadiva has been called, induced many men to proceed thither between 1840 and 1844 and rush headlong into Coffee planting. It is amusing to call to mind how many of them made a mystery of the object we had in view, all afraid lest too many should enter into the undertaking; it was never regarded in so equivocal a light as a speculation. It was only to those intimately interested in their success that even the green, leafy covering of their views in life was exposed, whilst a peep at the golden harvest was granted exclusively to the few who warmed their toes on the same fends, when the short hours of a winter's morning still found us dilating on the El Dorado of our imaginations. The writer thus continues:—

Of the hundreds, who, between January 1841 and December 1844, arrived at the "Spicy Isle," or impowered agents to invest their money in cultivating the Arabian shrub, perhaps 90 per cent lost their all: 7 per cent more managed to pick up sufficient of the fragments of their once stately barque to build a little boat and escape from the floods which engulfed so many: 2 per cent took the hint in time and got clear off, whilst the odd one may have made a fortune.

As a body the planters of Ceylon had themselves to blame for very much of their disasters though individually most may plead that they went with the stream. An infatuation appears to have possessed them and they slumbered on, like the narcotized opium smoker, who having filled his lungs with the fumes of the pernicious drug, throws himself back on a couch, his nerves stimulated and his muscles flaccid for a time, whilst his mind wanders in fairy scenes and pictures future ease and repose. But time wears away the veil, he begins to be conscious, he feels a lightness in his chest, he awakes to the reality of his position—all his bright visions have turned to gloomy forebodings and blue-



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devils, but he cannot extricate himself, he is tangled in the meshes of the toil, which he has woven round himself. Such, it must be confessed, was the diseased state of public mind in Ceylon; nothing was thought or talked of but planting, and a Scotchman, absolutely planted a field with Coffee in the height of dry season. The mania for planting in Ceylon was as great and as disastrous in its small way, as the Railway furor in England, the absurdity of which the planters saw through at once. The Governor and his Civil Servants dabbled in the speculation and scalded their fingers. High Civil and Military Officers, both of Her Majesty and the East India Company, entered into the enterprise, many of them far beyond their means. Merchants, trades-people and private individuals all took tickets in the lottery, drew blanks and when too late regretted it.

Freely the faults of our neighbours we blame.

But tax not ourselves though we practise the same.

The most extravagant estimates were published and circulated at home, bearing such good names that their correctness was never doubted. One made out that 300 acres might be planted, kept up, and all the Coffee to the end of the 5th year from commencement, be housed and cured for £ 3,040, whilst the produce during that time would sell on the estate for 35s. per cwt. or £4,230 for the whole, leaving a net balance of £11,900 profit in five years and a property worth £15,000. Such statements emanating from the sources they did, could not fail to entrap many even of the cautious and wary.

The magnitude of the "Coffee Mania" and the rapidity with which it spread may be judged of from the following figures. The quantity of hill forest available for the cultivation of Coffee, sold by the Government up to October 1846 (since which scarcely any land has been sold), was 287,390 acres. Previous to January 1841 very little land had been disposed of. Of this vast tract of private property, we find by official returns that on the 31st December 1847, there were 50,070 $\frac{3}{4}$  acres cultivated, of which 25,198 $\frac{1}{4}$  were planted previous to the 31st December 1844, and the remaining 24,872 $\frac{1}{2}$  in the three following years. The gross cost of this is said to have amounted to the enormous sum of £5,000,000 sterling.

The following is a comparative statement of the export of Coffee from Ceylon for 14 years, ending 1849: it must be borne in mind that nearly the whole of what was shipped prior to 1842 was native grown.

There were exported of Coffee from the ports of Ceylon,

In 1836	...	60,329	cwts.
1837	...	43,164	"
1838	...	49,541	"
1839	...	41,863	"

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In 1840	...	63,162	cwts.
1841	...	80,584	"
1842	...	119,805	"
1843	...	94,847	"
1844	...	133,957	"
1845	...	178,603	"
1846	...	173,892	"
1847	...	293,220	"
1848	...	279,715	"
1849	...	373,368	"

When planting first came in vogue, the Kandians flocked in hundreds to the great distribution of rupees, but this source of labour was soon found to be insufficient and of too precarious a nature to be relied on, even had there been a superabundance. The Kandyan was able to live on the produce of his rice fields &c. &c. before European capital was introduced, and he has such a reverence for his patrimonial lands, that were his gain to be quadrupled, he would not abandon their culture, it was only therefore during a portion of the year that he could be induced, even by the new stimulus, money, to exert himself. Besides, working for hire is repulsive to their national feelings, and is looked upon as almost slavery. The being obliged to obey orders, and to do just what they are commanded is galling to them.

Next came the Lowlanders (Singhalese from the maritime provinces) who have a stronger love of gain, a liking for arrack and rooted propensity to gamble. In 1841, 1842 and 1843, thousands of these people were employed on estates: they generally left their homes for six months at a time and then returned with their savings, some to spend their hours in indolence and their earnings in debauchery, others to lay up their gains and profit by the profligacy of their neighbours; after a few months leisure, they revisited the estates. The sudden access of wealth amongst them soon engendered as much independence and far more insolence than were to be found in the Kandians: this source of labor which had at first poured forth so many thousands of useful members of society, became dried up, and the Lowlanders were only known in the central province, as domestics, artificers, traders and carters.

Southern India stepped forward to fill up the vacancy occasioned by the cessation from labour of the sons of the soil. So early as 1835, Tamil coolies had begun to immigrate into Ceylon. It would appear that for some years, whilst wages were low and no great demand for their services existed, Malabars, as Tamils are indiscriminately called, must have come over with the intention of settling, or at least of being a long time absent from their country; as the proportion of women and children was much greater than afterwards.

Looking at the annexed table, we find the greatest number of coolies that arrived in one

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year, was in 1844, which may be accounted for thus: before the end of 1843 the Kandians had ceased to afford sources of labour, the Lowlanders were becoming independent not to be relied on, the "Mania" was raging at its height, and in the three previous years the departure of Indians had exceeded the arrivals by 14,823 souls.

Return of Arrivals at and Departures from the ports of Ceylon of Tamil Coolies, from 1841 to 1848.

Years.	ARRIVALS.			DEPARTURES.		
	Men.	Women.	Children.	Men.	Women.	Children.
1841	4,523	363	164	4,243	274	117
1842	9,025	279	166	10,691	345	228
1843	6,298	162	248	18,977	194	482
1844	74,840	1,181	724	38,337	825	535
1845	72,526	698	177	24,623	145	36
1846	41,862	330	125	13,833	48	23
1847	44,085	1,638	417	5,897	79	33
1848	12,308	504	229	12,749	229	15

During the years 1841 to 1846 the Tamil labourers must have saved or remitted to their country from £385,000 to £400,000: whilst the value of rice imported in Ceylon during the same period, chiefly from the Malabar and Coromandel Coasts, was valued at £2,116,189.

But against this pecuniary advantage, a great loss of life is to be placed, for during the eight years above enumerated, not less than 70,000 Malabar coolies are believed to have died in Ceylon. The planters have been most unjustly accused of aiding disease by neglect and harsh treatment. Such was not the case: I may safely say that medicines and professional attendance on the labourers, form no inconsiderable item in the accounts of almost every estate, not to speak of the indulgencies, pay and attention, bestowed on the sick. The Tamils leave their homes to make a little money and to return as soon as possible; when they arrive on estates they are fatigued by a long journey, performed under great privations, the rice they bring with them is barely enough to support life until they reach Kandy, the road they traverse from the coast to the mountain capital is notoriously insalubrious, the water on it is scanty and bad, and during the period alluded to there were no houses to protect the wayfarer from rain or perhaps more baneful dews. Thus fatigued and emaciated, they begin their labour either with the seeds of fever in their constitutions or at least predisposed to disease; in place of living well and renovating their strength, they hungered themselves and existed upon the veriest trash and carrion, in order to lay by the more of their earnings, thus frauding their employers and committing *felo de se* at the same time. There were a few men on most of the old estates who have lived in the same febrile atmosphere for years,

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but they feed well and have very slight attacks. The Tamils were vastly overpaid for their work and their master did not get value for his money, but until some higher motive than that which now actuates the Singalese, shall stimulate them to labour for reasonable remuneration, the Indians will continue to obtain the same price for their feeble exertions. It is a disgrace and reproach to the people of the soil, that they pass the day in indolence and sloth, whilst strangers are cultivating their land, and amassing and carrying off the riches which they have only to stretch forth their hands and arrest.

The chief causes why coffee planting failed to be remunerative are traceable to two sources,—those who embarked in the speculation and the government. Want of knowledge and forethought on the one hand and culpable apathy on the other, are the prominent features which now appear to have led to the disastrous results. The knowledge which the former lacked was both local and general; they knew little or nothing of the country and less of the sources of industry and in too many instances a lamentable ignorance of the value of money was displayed; thousands of pounds being laid out, where there never should have been any hope of seeing it returned. In some districts estates were formed on the most villainous land, disintegrated quartz rock with a little black mould on the surface, which as soon as the plants were put in, was washed away by the first thunder-storm.

*Spem gregis, Ah! silice in nuda \* \* \* reliquit.*

Others were so much exposed that the violent winds destroyed in a few days, the growth of the previous nine or ten months.

The price of labour was raised to 18s. 9d. per month, for which there were only 25 working days, equalling 9d. each, a rate at which coffee planting cannot be profitable, considering the small amount of toil done by the Tamil and the high cost of transporting produce 100 miles by land. Then again, though so highly paid, the coolies were not made to do more than two-thirds of what they could have done if forced to exert themselves; for some planters were negligent in looking after them, whilst others allowed them to do much as they liked in order to give the estate a good name on the coast. Now this was great injustice to their neighbours, because the man who would have a quid for his quo, got a bad name and the Malabars would not serve him, or if they did for a short period, generally absconded at his busiest time, when he had the most need of them.

The early estimates and accounts led us to believe that the average cost for cultivation, up keeping, and housing crop during the first five years would be little over £10 per acre; practice has however been, on an average, expended during that period, and with what result? In place of having properties worth thousands of



pounds, many estates which cost from £5,000 and upwards have been abandoned as perfectly valueless, whilst others have been disposed of for one fifth of the amount expended on them.

The government was expected to have opened up the country with roads, and purchasers of land, in many districts, bought it under the belief that such would be the case, but there were not aware that to promise and to perform are very different things.

The Ambegama road, which was to connect the southern coffee districts with the highest navigable point of the Kalaneyganga, a most desirable undertaking and feasible in theory and on paper, was begun in or prior to 1842 and was not completed a few months since, though the distance is only 41 miles. It was a pet-project of the government and the engineering difficulties were small. A great "Trunk line" was commenced (at the end of 1842) at Peradenia and was to have led to some place or other, opening up the coffee estates of Hantana, Nilamby, Dellotte and Hewechetty, thickly peopled Carle of Maturatta, and the rich Ratemabatmaite of Walapana with its fifty fertile valleys, but after costing in the coolly thousands of pounds it appeared to hide its head in the forest and die, and its course beyond the first half dozen miles would be as difficult to trace as that of the Niger or Amazon. All that was done for Lower Dumbura was to build an expensive bridge over a small stream, where it was little needed, and to lay a heavy toll on it.

But on the main route from the coast to Kandy, the road by which labour, the main-spring of the island's prosperity, is admitted, not even an attempt was made to facilitate the Tamil's ingress and to preserve his health. This route passes through a part of the country almost uninhabited, where the water is bad, the air impregnated with miasm, and the face of the country covered by jungle, filled with wild beasts. If we look on the Malabar cooly as a fellow creature he surely deserves our sympathies under troubles and difficulties, and without reference to his disposition, nature impels us to help him. If we view him in a merely mercenary light, it is the duty of the government and his employer to protect and assist him, for though he comes with the selfish motive of earning all he can and taking as much as possible out of the country, yet the obligation is mutual and he could better do without the government and the planter than they without him.

Not only had the owners of estates a right to expect, if not to compel, the ruling powers to facilitate the communication between the interior and that part of the coast where immigrants land in the greatest numbers, and to afford them protection against weather, man and beast, for they had paid into the Treasury not less than £71,840 for their land, but the coolies themselves

had a strong claim on the government, on the broad principle of "what have you done for our money." A heavy customs duty (7d. per bushel) is levied on rice, and it is known that from 1841 to 1848 inclusive, there were imported into Ceylon 14,052,865 bushels of rice, by which the Colonial Exchequer received £409,960. Of this sum, I consider that fully one-third was paid by individuals living in the Kandyan country. However, to be within the narrowest limits, I will suppose that during the above period 245,000 continental labourers entered the province, and by remaining on an average of six months, each contributed 3s. to the rice revenue, we have thus an amount of £36,750 for which the local government made no direct return.

There was not any check on the public carters who conveyed the produce to the shipping port; these men could with impunity take a portion out of each bag and supply the deficiency of weight by watering the rest, thus not only thieving a part of what was entrusted to them but damaging the remainder. The manner in which this is performed is very simple: the coffee being extremely dry and having a strong natural affinity for moisture, porous vessels filled with water were disposed amongst the bags, and the damage is done by evaporation and absorption.

The life of a planter is lonely, monotonous and unintellectual. If he be determined to do his duty to the proprietor (whether himself or another owns the lands) he must be contented to renounce society, to withdraw from frequent intercourse with his countrymen and almost to give up the recluse's greatest resource, reading. He must rise before day-light and hurry to the coolies' huts, to endeavour to get them on the work field before sunrise, he must stand over and watch that they do not skulk their work, in rain or blazing heat, until 10 A. M.; he has then generally a mile to walk home to breakfast, which having swallowed he must see what the artificers have done during the morning. At noon he is again with the labourers and drives them until half past five, when he returns to his house, worn out in body and harassed in mind by the annoyances and laziness of all around him. By the time he has refreshed himself with soap and water his dinner is served, after which he may nod, half an hour, over a newspaper, and lay down his weary limbs for the night at half-past seven. Sunday is the only day he has to hold intercourse with his neighbours, to shave himself and arrange his private affairs.

Such a life is bad enough in fine weather, with plenty of clean clothes and food in the house, but is perfectly disgusting in the wet season. At such times there is a good deal of work to be done, such as planting out young trees, weeding, and often gathering the ripe fruit.

I shall now give some account of the cultiva-

tion of the Coffee plant. Its introduction to Ceylon must be of considerable antiquity, it having most probably been brought from the Red Sea direct at a very remote period. The young plant is a pretty shrub, the branches grow in pairs, alternately, those near the root extending the furthest from the stem and the others gradually shortening to the top, give a pyramidal appearance; the leaves are large and of a rich, deep green.

In offering the following remarks on this very important branch of tropical agriculture, I wish to point out what appears to me (after many years of practical attention to the subject) the best plan to follow in Ceylon. It must therefore be borne in mind that I do not write of cultivation generally but locally; nevertheless, I think that some parts of the Ceylon *modus operandi* may be introduced into other colonies with advantage.

In this culture, the first care is the selection of locality. This is of such paramount importance that if a material error be committed in choosing the land, all future economy, care and exertion will be but thrown away. The great requirements are elevation, shelter from wind, quality of soil, and proximity to a cart road.

The coffee plant will grow and reproduce itself on a level with the sea, and, at 2,000 feet above it, the trees whilst young, will have the most luxuriant appearance, come soonest into bearing and yield the greatest measurement quantity per acre, but the bean is light and of an inferior quality. At and a little below this height are extensive tracts of the richest land but they are subject to long and frequent droughts, the crops are in some seasons scarcely worth collecting and plantations formed in such lands must soon fall off. This has been demonstrated on the plains of Doonbera, where most of the estates have become comparatively worn out in eight or nine years.

The best properties are situated on the mountains, where rain is frequent and the temperature moderate. The soil is not generally quite so rich as in the valleys, but the forest being heavy and the fallen timber decaying gradually, a small though constant return is made to the land, whereas the trees cut down on low gardens are carried to the towns for firewood and other purposes.

The aromatic properties (and consequently fine flavor) of the coffee plant are best developed between 3,000 feet and 5,000 feet above the ocean. The higher it is cultivated with care, below frost, the better will be the quality of the produce. A mild climate and rarified air are highly favourable to coffee, both of which are given by elevation. The cool climate of the Kandyan hills is equally invigorating to the planter and his shrubs, both luxuriating in a temperature of from 55° to 60°, night and morning, whilst the thermometer rarely rises above 73° at noon.

In the elevations above 4,000 feet the trees do not yield a maiden crop until three years after planting out, and at four years old they are in full bearing. The wood taking long to grow is hard and firm before nature calls on it to support fruit, and it is reasonable to expect that it will remain longer in full vigour than a plant which is forced by the heat of lower situations into a rapid growth and speedy fructification, and which prevents the application of nourishment from the completion of its own body to the precocious reproduction of its species.

The appearance of "high mountain beans," is long, blue, the longitudinal seam curved, with its sides close and compact, its specific gravity is greater and its aromatic principle more abundant and finer than that produced on low lands, which I attribute to its being grown slowly in a cold climate. Though the quality on the hills is superior, the quantity is less. Seven cwt. per acre is calculated upon, whilst 10 cwt. is the average from low lands, though it is said that one of the Hunesgeria estates once returned 18 cwt. per acre.

I do not think that the difference of cost when laid down in Kandy between 50s. and 8s. (London prices) on coffee exceeds the ratio of 2 to 3, and in most instances the proportion is lower, on the latter, the weight of the produce of one acre being less, the cost of land carriage, freight, Colombo and London charges, &c. &c., are proportionably lower and the profit higher. But there are other and more cogent reasons for preferring the hills; amongst the rest, coffee is one of those articles of which, though the inferior qualities may be unsaleable in Europe, a superior sample will always meet with purchasers about its real value, as it is consumed by a class who will have it and who consequently must pay for it as a luxury. This was clearly shown in 1847 and 1848, when although "Ceylon plantation" was sold from 35s. to 50s. per cwt. as a general price, a few samples from the highest estates brought 85s. and 92s.

In selecting land it is better to choose an easterly or northern aspect, for though the morning sun falling on the dew is said to injure the plant, and the setting sun to improve its fruit, the advantage of shelter outweighs these considerations. Where land lying to the S. W. has to be opened, the manager will do well to take advantage of the natural facilities offered by the undulation of the surface, and from fields, so as to avail himself of the protection afforded by rising ground with a belt of forest trees on its summit to windward, and such fields should vary from 7 to 10 acres in extent.

The southwest monsoon not only blows with great fury in the hill region of Ceylon, but appears to exercise a blighting influence and to curl up and wither the few leaves it does not beat off the trees. After a strong gale, a field



of coffee exposed either to its direct influence or to an eddy wind, which is if possible more baneful, will be found in a great measure denuded of its leaves, the berries beaten off and the bark of the trees seriously injured round the part of the trunk where it strikes through the earth. When this is the case the best plan is to drive three stakes into the ground round the tree, and tie it lightly in such a manner that the friction and consequent excoriation may at least be avoided, cut the plant down to two feet and propagate the plantain tree for shelter. Under this management the shrubs spreading laterally will soon interlace their branches, render mutual support to each other, cover the ground and so acquire strength enough to resist the force of the wind in a great measure, and then the plantains may be eradicated, and the land if tenacious will have been improved by their growth.

The best soil is of a deep chocolate colour, friable and abounding with blocks and small pieces of stone, which in the rainy season prevent the excessive washing away of the mould, and by their obstructing evaporation in the dry weather, afford refreshing coolness and moisture to the roots of the plants; such patches of land are generally found at the bottom of the escarpments of the hills, or in elevated valleys and rarely on the slopes. Quartzose land, of which there is much, must be carefully avoided and clay is equally bad. I have seen quartz land, which looked more like sugar-candy than anything else, planted and grow tolerable trees for a year or two, but they could never screw themselves up to the fructiferous point. There is a black earth too, which has deceived some people, it has the appearance of fine rich garden mould but is in fact disintegrated quartz and mica, not having any of the good felspathic components in it. It is of no use planting in a good surface soil unless it have at least two feet depth, as the coffee tree has a long tap root.

The first work is to prepare a nursery, which must be proportioned to the extent of land to be cultivated; and situated with regard to proximity to the intended fields. The forest having been cut down, the branches and logs are rolled on one side and the earth dug up a foot deep, all the roots and stones being carefully removed; it is then laid out in beds, six feet wide, with trenches between, which serve the double duty of drains and paths. Good seed having been procured, the grains are sown six inches asunder; if the land becomes parched, it will be well to shade it with green branches and irrigate it night and morning; should a long continuance of rain follow the sowing, the seed sometimes decays in the ground. It requires from six weeks to three months, according to moisture and warmth, before it germinates, and in four months more the seedlings are ready to be transplanted.

On opening an estate the manager must look

for his best soil and fell the forest in patches of not more than 30 acres in area. Some plantations have fields of two or three hundred acres and in one instance there are one thousand acres in one clearing, but that is, to say the least, a very hazardous plan, for on such properties it is not a rare occurrence to see several acres together blasted by the wind and either permitted to run to jungle again, or dragging on a blighted, sickly existence at an enormous and profitless outlay of capital. But such are generally old properties, and to the individuals who formed them, little if any blame can be attributed; they acted to the best of their judgments but lacked local knowledge. Many of those who now boast of their better management are but profiting by the dear-bought experience of others.

When the forest is felled, the small branches must be lopped off and the larger ones thrown on them, which expedites the drying of the wood. Should there not be rain the timber may be set fire to in a month, but as showers are frequent, it is generally ten weeks before it is sufficiently dry for burning. After a good running fire, very little has to be piled in heaps and consumed, as making neat work is a useless expence, baking the land destroys a great portion of its most valuable vegetable component parts and the timber when left to decay forms excellent manure. The smaller branches which are not consumed, should be cut up and laid as much out of the way of the plants and movements of the labourers as possible, but not burned. For the information of those who have not seen a coffee garden, it bears no resemblance to an European garden. The land is generally a steep hill side with undulating surface, huge rocks protruding their crowns and enormous blocks of stone studding the whole extent. Blackened trunks of trees with their branches sprawling in all directions give the field the appearance of having once been the site of a town which is now laid in ashes, a confused heap of calcined stones and charred rafters. When cleared the ground is marked out by a line and pegs, in squares of six feet every way and at each peg a hole 18 inches cube is dug. These are filled up with surface soil, and when rain sets in the seedlings are transplanted from the nursery to them. This would give 1,210 trees per acre, but owing to the rocks, streams and paths, where plants cannot grow, the average is 1,000 per acre. There is difference of opinion as to the distance trees should be apart from each other, from experiments and observation, six feet is the best,—if they are further off, they will not cover the ground, in which case both land is lost and the weeds grow more easily,—if they are closer than six feet the plants are subject to breaking and injury, as their branches lock into each other and obstruct the workman's passage.

From the time of planting, the fields must be kept free from weeds, which may be done by

slight expence, if care be taken never to allow them to seed. Where swamps are found in a field, I should recommend their being drained as much as practicable and planted with guinea-grass or lemon grass, either of which will soon cover the ground, prevent weeds growing and spreading their seed, besides it is turning the land to account, for the former grass is excellent forage for horses and cattle, whilst the latter is the herb most used for thatching buildings, and even if there is a superabundance it would be profitable to cut it for measure. The most troublesome weeds on the hills are the Spanish needle, sow thistle and elk-plant. Ferns are also numerous. The Spanish needle seeds in five weeks and multiplies itself at least two hundred fold each seeding, so the reader may easily imagine the necessity for taking these noxious plants out in time. The low estates are subject to all these and several grasses, besides wild spinage, and worst of all Iluk-grass, which is of the *Andropogon* family, I believe *Andropogon caricosum*, if it once gets fairly rooted the expence of eradication is enormous. Weeding should be done by the hand and on no account with the hoe; the sloping surface affords sufficient facility by its steepness for the deluging torrents of rain to wash away the richest ingredients of the land, without its being unnecessarily loosened. Hoeing is only excusable when weeds have been suffered to flower, when they may be cut down to prevent their increase, but hand work must soon follow as the roots have been strengthened by having the stalks cut off, gain a firmer hold of the soil and will shoot up more vigorous stems.

The coffee tree, if allowed, attains 15 feet in height, but in Ceylon plantations they are all kept down to 8 or 3½ feet above the ground. This makes the shrub shoot out laterally and produce at least 25 per cent more than it would do if permitted to attain its natural height and to occupy more land. In topping care must be taken to cut off the uppermost pair of branches as their weight when in fruit would split the head of the stem. Nature is constantly throwing out young shoots, which try to grow upwards, but they must be carefully broken off as they are a great and useless drain on the juice of the plant. Never cut a sucker or branch off a tree when you do not wish another to come, but always break it.

From flowering to harvest is from 8 to 9 months. A field in full bloom is a beautiful sight, the clusters of white blossom contrast prettily with the deep green leaves and the whole at a distance looks as if it had been snowed on. The flower only lasts one day. If the atmosphere be dry the bloom is sometimes lost, as it will not set without moisture; mists and light drizzling rains are the most favourable weather at this time. The fruit grows on a foot stalk of

half an inch, in clusters round the joints of the lateral branches, and when of full size, but still green, resembles small olives. A month before ripening it turns yellow and through different shades to ruby red, when it is ripe, and from its likeness to our European fruit is technically called "cherry." During the later part of its growth, particularly, it requires a great deal of moisture, otherwise the bean will be shrivelled, not perfectly formed, light and of inferior quality. The climate of the hills is most beneficial when the fruit is filling and just before it ripens.

I have described what "cherry" is, we will now open it and find that it contains "pulp" in which are two seeds. They are covered by a viscous substance called "gum", and integument known as the "parchment" from its resemblance when dried to that animal product, and a pellicle named the "silver", which is very like gold beater's skin, and the grains of coffee, which are styled "beans:" sometimes there is only one bean in a cherry which takes a more rounded form and is called "peaberry." This is caused by only one of two embryos coming to maturity, whilst the other is abortive, the rudimentary form of which is always apparent.

When the fruit becomes blood red it is perfectly ripe and should be gathered. To the height of 3,000 feet the chief crop ripens in October and November, and a small second gathering is looked for in May. In the course of a few days the cherry passes from yellow to blood red and a great number of coolies must then be employed—for once ripe the sooner it is plucked the better. On very high plantations, though the heaviest gatherings are in June and December, some fruit is arriving at maturity almost all the year round; blossom, green and red berries, may frequently be seen on the same tree. This gives more trouble to the superintendent, but is better for the proprietor, who is not obliged to engage a large force of labourers when every one else wants them and when the Malabar knows his own value. Where the crop extends over eight months of the year, the facilities for curing it are much greater and the cost of transport lighter.

When the quantity of coffee is small it is usually dried as plucked from the tree and the flower is found superior to that which has been divested of its pulpy covering. But when the plantation is in full bearing, the extent of drying ground required, the length of time and the labour of moving so vast a weight, preclude the practicability of this plan. A pulping house must then be built: it should have a loft to receive the cherry and from which the machines are fed, a pulping room below where the mills are stationed, with a tank underneath. This building is all open, walls not being required.

The "pulper" is an oblong frame on four legs, furnished with a cylinder covered with cop-



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per which has been perforated by a triangular punch, from the side laid on the wood, leaving three pointed asperities on the outside, like a nutmeg grater. In front of the grater is an iron bar or "chop", at a distance regulated according to the size of the bean, and a lower chop so nearly touching the copper that a sheet of letter paper may just pass through. A rotatory motion being given to the cylinder, the hopper above it being supplied with berries and a constant stream of water kept up, the teeth of the copper draw the berries against the chop and there not being space enough for them to pass between it and the cylinder, the pulp is torn off, carried between the lower chop and the barrel and passed away behind whilst the beans are thrown out in front on a sieve, under the machine. The pulped coffee falls into a cistern below and the "passed cherries," with a few stray husks, are returned to the copper.

The coffee is next thrown up together and allowed to remain heaped, until the gum is sufficiently fermented to be washed off, which is known by its feeling rough in the hand; this will take from 12 to 36 hours according to the quantity heaped together and the temperature of the air; great care must be taken not to over-heat it. Coolies must then dance amongst it for half an hour and a stream of clean water being let in and the coffee agitated by rakes or machinery, all the gum and dirt will soon be carried away. The beans which rise to the surface of the water, being inferior and imperfect must be floated off into another reservoir and separated. The store or ware house may be constructed of any shape and materials, which circumstances or fancy dictates. It may be built of brick or timber and covered with tiles, felt or corrugated iron, but the most economical stores have the walls of jungle sticks and clay, are thatched with lemongrass and have a loft or second floor in the slope of the roof, they are erected at a slight expence and answer every purpose. On some estates the pulping mills are turned by a water wheel, which is a great saving of labour at the time when it is most in demand, but on the high hills, the cost of transporting heavy iron work is so great, the wages of good artificers so high, and the difficulty and delay in repairing any accidental damage so retarding to the other operations, that hand work is likely always to predominate.

Drying platforms, like the barbaces of the West Indies, are not uncommon, especially amongst old estates; they are constructed of broken stones pounded together and glazed with a composition of mortar, fine sand, palm sugar (that from the palmyra being preferred) and bark juice, but as the cost is heavy, many planters prefer giving the ground a slope of 1 in 20, claying it and spreading matting to receive the coffee. Perhaps the best contrivance is a set of

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trays on wheels, fitting into a shed, one under the other, and which can be run in and out, on a tramway as the weather suits.

If coffee get two days' sun after washing, there is not much fear of its being injured by being kept long in store, indeed at this stage it is advisable not to expose it to the direct influence of the sun for nine or ten days, as the gradual drying causes the silver to separate itself from the bean and to hang on it like a bag. Coffee slowly dried will be easily divested of all the silver, as just stated, and a clean sample insured, but however ripe the cherry may have been when gathered, if the bean is hardened quickly, a portion of the pellicle will adhere, leaving a dirty sample and the impression on the buyer that it had been plucked half ripe. I consider too, that the quality of the article is improved by slow drying or more properly speaking that less of the aromatic principle is evolved. During rain, which is generally very abundant at fruit time, the wet coffee must be spread under cover and constantly turned to prevent its heating, and even that which is partially dried should be worked over twice a day, as a very little moisture in a large heap soon causes germination to commence and gives to one end of the bean that peculiar red tinge, known as "foxy" in the London market.

Produce must be hard dried, until the grains resist the nail and are quite horny, before it is despatched to Colombo; but in the parchment, the protection against moisture which this shell affords, more than counterbalances the cost of its transport. After its arrival in the seaport no time should be lost in cleaning and shipping it, having been sunned, it is put in a circular trough and a heavy wooden wheel passed over it, until all the husks are broken; it is then fanned and agitated in a perforated cylinder, through which the small beans and broken pieces fall.

It must be packed in well-seasoned casks and shipped immediately, for if exposed to the saline damp, with which the atmosphere of a tropical shipping port is generally charged, it will soon attract so great a quantity of moisture as to turn flexible and black; — there are few simple vegetable products, dyes excepted, which owe so much to their colour as coffee does.

It is only a few years since capitalists began to turn their attention to the agricultural resources of the Kandyan country and yet the export of plantation coffee from the island during the year ending 10th October, 1850, was more than 235,000 cwts. The spur given to the villagers may be seen by comparing the last year's native export of 125,000 cwts. with the total shipments in the years 1836 to 1841, as given in the early part of this notice.

The first adventure naturally selected their lands near a government road and hill estates were not so much as dreamt of, until all the

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available low lands were bought up. In one instance the enterprising but unfortunate proprietors believing it necessary to till the ground, went to work at a great expence, removed all the roots and ploughed up the land, but the result was a signal failure. Others left the largest forest trees standing for shade, but that has also been found injurious.

Ceylon is peculiarly adapted to the growth of coffee, and very good land may be found with a little care in selection. Being a mountainous island, with three sides open to a vast expanse of ocean, drought is little known; even in the driest seasons the hills attract clouds, which frequently pour down refreshing showers. The heavy mists and dense clouds which sometimes shut out the sun for days together, or rolling sluggishly along the mountain sides, are amongst the planter's best auxiliaries. The shrub luxuriates in a rarified, temperate and moist climate, and delights in frequent but not heavy rains on the slopes, where there is a good natural drainage—for any lodgement of water about its roots soon proves fatal.

Want of facilities for manuring, the attacks of vermin, the absence of a working population and state of the roads are amongst the greatest drawbacks.

One great error into which speculators fell, and in which we must now confess we showed childish ignorance, was to expect that the land was so rich as to be able to keep the plants up to one uniform point of fruitfulness for fifteen or twenty years without manure. It requires no knowledge of chemical agriculture, but only calm, unbiassed reflection to convince us that the richest mould cannot yield crop after crop for years, unless a proportionate return be made to it; to say that it can, would indeed be giving inorganic matter a self germinating principle. Many have tried decayed coffee pulp as a renovator, under the impression that by so doing they were placing in the ground what they wished to draw from it, but practice has too fully exploded the theory to leave any necessity for explaining its failing on scientific principles. At the same time it is equally certain that the coffee pulp in combination with other vegetable, animal and mineral matter, may form a valuable renovator of the soil. The skill of the chemist may be very advantageously brought to bear on this subject: he finds that the plant and its fruit are differently composed; he knows that it is more necessary to provide for the fruit than the stem which supports it; he finds that a large proportion of the analytical composition of the bean is nitrogen, which his science teaches him may be produced by certain phosphates &c. under particular circumstances; the knowledge accumulated by his own and other men's researches point out at once where salts and gases may be found and he works on a certainty. He can in a few days and at tri-

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pling cost produce what the uninitiated may spend a life time and a fortune over without attaining. It is pitiable to see the manner in which the most soluble and the best portions of the soil are washed away by the rains; this is a subject which equally deserves the attention of the planter, with the manuring question.

There is an animal known as the "rat," which does much mischief by gnawing off the young branches, apparently to get at the tender pith; it is called "Daddawedda" by the Singalese, is as large as a weasel and of a greyish-black colour.

Monkeys, squirrels and the Daddawedda commit great depredations in fruit time; they are partial to the sweet pulp which they digest but evacuate the beans whole.

The devastation caused by the Coccus insects commonly called the "bug" is lamentable in the extreme; a tree attacked by this pest has the appearance of having had a bag of soot shaken over it, the leaves and much of the green fruit fall off and the plant is long ere it recovers its vigour.

Transport is a heavy item from the estate to Kandy. The produce is generally carried the greatest part of the way on pack bullocks, and from thence to Colombo cart hire frequently rises to 2s. 3d. per cwt. for coffee in the parchment. It is almost impossible for hill planters to work their own cattle, as the native drivers neglect them and often use them to their own profit, so the transit is generally effected by contracting with a Mahomedan drover. Absentees urge on their representatives that they should keep plenty of cattle for home use, but they little know the difficulty of purchasing stock and the heretofore almost impossibility of keeping them. The grass land on the hills, produces an herb quite unfit for the food of neat cattle, the native takes no interest in the white man's stock and disease is prevalent amongst them.

Beyond the growth of coffee, the productive resources of the Kandyan country are very great but who will develop them.

Nutmegs have been tried but with what result I know not, the only plantation of them was young and not in bearing when I left the colony and I have not seen any notice of it in the local papers. It is a very costly, hazardous and anxious culture—the plants require 10 or 12 years to attain their full vigour of bearing, and what changes in prices and prospects may not occur in that time. It is one of the many plants peculiar to that rich and beautiful region, the Indian Archipelago, and how it may thrive and to what extent its spice producing power may be weakened by naturalizing it in Ceylon I know not.

Cloves will probably never be tried, for they are more tenacious of their Archipelago home than even the nutmeg.

Though the cacao flourishes well in the Per-



denia gardens, it should not be attempted as an article of extensive cultivation. Great humidity is favourable to it only when it augments gradually and continues a long time without interruption. Heavy, occasional showers are very injurious to it. When the fruit in the dry season is wetted by a heavy shower it drops off. The harvest is very uncertain, besides the trees do not bear under eight or ten years, and it can be produced cheaper in its native country than in Asia.

Castor seed might be profitably grown by the natives in the same manner as they produce their coffee which requires little exertion beyond the gathering and conveying to town, and I do not see why the oil should not be made as cheaply and as good in Colombo as in Calcutta.

Fibrous plants are beginning to meet with a portion of that attention which they so richly merit, and a day may yet come when Ceylon shall export jute, sunhemp, (a substance equal to Manila hemp), and cloths equal to the finest cambrics, manufactured from the leaves of the alac and pine-apple.

The cactus and mulberry thrive well but we can scarcely look for silk or cochineal.

There is a plant but little known, yet by no means uncommon in the Kandyan province, which might be easily made to afford an article of export. I mean the Cassava, which is the real *Jatropha manihot* or tapioca plant. It does not require much care, is ripe in seven or eight months and the farinaceous substance contained in the roots is extracted by the simple process of scraping, washing and evaporation.

The very beautiful, peculiar and useful class of plants Schitamineæ might be very easily turned to good account; there are extensive tracts of land now useless, which might be made to produce arrow-root, ginger, turmeric, and cardamoms, in great abundance and of excellent quality. But to do all this neither labour nor manure must be spared. Such an undertaking could not repay a man of property and education. The labouring classes of Europeans cannot work in the tropics, at least at such elevations as the above mentioned plants thrive. The natives are too wanting in energy to embark in these new speculations. The Indians are keen traders and not given to agriculture, or are persons who come over from the coast for limited periods to earn a few rupees and return. The Eurasians are not an agricultural class and probable never will be so.

The men who could be most advantageously introduced would be Chinese. They are a people of a laborious, plodding, energetic and enterprising character, with much greater physical strength than Indians or Singhalese and constitutions better adapted to exertion in a hot climate than Europeans; if kept under due restraint they would be the best colonists. There is

no race who can turn land to better account by mere labour, unaided by science and advanced art.

Were a colony of 300 or 400 of them established in Doombura, for instance, on the present waste government lands, or on the old coffee estates, I doubt not that the most beneficial results would ensue. All that they want is a community of their countrymen and to be well supplied with such Chinese articles as they are used to. A small colony judiciously planted would cause a demand and consequent supply of those articles which are essentially necessary to make them comfortable, whilst they would furnish the Kandy and Colombo markets with merchandize at present scarcely known. If this first establishment succeeded, every season would reinforce their ranks with recruits from their native land. In addition to all their industrial habits and artistic acquirements, they have a great recommendation—that if they can make a living they will attach themselves to their adopted country. If they make fortunes they are even more bound to us, for whilst they and their property are under the protection of our laws, both are safe, whereas if they return to China both are in jeopardy. The Kandyans would intermarry with and bind them by closer ties than even the precious links of £ s. d. to the fertile isle. Their religions are in name, though not much in reality, the same, and being a money making race, able to keep women in slothful indolence and comfort, the celestials would be looked upon as eligible matches for the young girls of the neighbouring villages. I would not be misunderstood and supposed to advocate the introduction of Chinese as labourers for hire—as such they would never do any good. They must have an interest in the produce of their labour.—*The Jour. of the Indian Archipelago*, No. 111. Vol. 11, March 1852, page from 123 to 142.

(627) COLOSSOCHELYS ATLAS. A communication was made by Dr. Falconer, conveying the substance of a paper by Capt. Cantley and himself on the osteological characters and palæontological history of the *Colossochelys Atlas*, a fossil tortoise of enormous size, from the tertiary strata of the Sewalik hills in the north of India a tertiary chain apparently formed by the detritus of the Himalaya mountains.

A great number of huge fragments, derived from all parts of the skeleton except the neck and tail, were exhibited on the table, illustrative of a diagram by Mr. Scharf of the animal restored to the natural size.

The communication opened with a reference to the reptilian forms discovered in the fossil slate, among which colossal representatives have been found of all the known tribes, such as the *Iguanodon*, *Megalosaurus*, *Labyrinthodon*, &c., besides numerous forms of which no

living analogues exist, such as the *Enalosaurian* reptile, and *Pterodactyles*. No fossil *Testudinata* remarkable either for size or deviation from existing forms, have hitherto been found in the fossil state. The *Colossochelys* supplies the blank in the first respect, while it differs so little from the land-tortoises in the general construction of its osseous frame, as hardly to constitute more than a sub-genus of *Testudo*.

"The affinities with *Testudo* shown in the shell and extremities were found to hold equally good in the construction of the head, of which a comparatively small-sized specimen, inferred to have belonged to a young or half grown *Colossochelys*, was exhibited. The head of the adult to correspond with the dimensions of the shell, and according to the proportions furnished by a large *Testudo Indica*, was deduced to have been two feet long.

The generic name given by the discoverers has reference to the colossal size of the fossil (*κολλοσσος* et *χέλυς*), and the specific one to its fitting representation of the mythological tortoise that sustained the world, according to the systems of Indian cosmogony.

"*Colossochelys Atlas*.—The first fossil remains of this colossal tortoise were discovered by them in 1835 in the tertiary strata of the Sewalik Hills, or Sub-Himalayah skirting the southern foot of the great Himalayah chain. They were found associated with the remains of four extinct species of Mastodon and Elephant, species of Rhinoceros, Hippopotamus, Horse, Anoplotherium, Camel, Giraffe, Sivatherium, and a vast number of other Mammalia, including four or five species of Quadrumana. The Sewalik fauna included also a great number of reptilian forms, such as crocodiles and land and fresh water tortoises. Some of the crocodiles belong to extinct species, but others appear to be absolutely identical with species now living in the rivers of India: we allude in particular to the *Crocodylus longirostris*, from the existing forms of which we have been unable to detect any difference in heads dug out of the Sewalik Hills. The same result applies to the existing *Emys tectum*, now a common species found in all parts of India. A very perfect fossil specimen, presenting the greater part of the evidence of the dermal scutes, is undistinguishable from the living forms, not varying more from these than they do among each other. Prof. Thomas Bell, the highest living authority on the family, after a rigid examination, confirms the result at which we had arrived, that there are no characters shown by the fossil to justify its separation from the living *Emys tectum*. There are other cases which appear to yield similar results, but the evidence has not yet been sufficiently examined to justify a confident affirmation of the identity at present.

The result at which we have arrived is, that

there are fair grounds for entertaining the belief as probable that the *Colossochelys Atlas* may have lived down to an early period of the human epoch and become extinct since:—1st, from the fact that other Chelonian species and crocodiles, contemporaries of the *Colossochelys* in the Sewalik fauna, have survived; 2nd, from the indications of mythology in regard to a gigantic species of tortoise in India."—*Jour. As. Soc. Ben.* No. 247 of 1855.

(628) COMBUSTIBLE MINERALS. Of this class of minerals, in India, there occur

Diamonds at Panna in Bundelcund, Mallavilly, Golconda, Masulipatam.

Sulphur, in Cutch, Seinde, Nepal.

Petroleum, (Asphaltum, Naphtha,) in Assam, Rangoon.

Amber, in Cutch, Assam.

Coal, in Tenasserim, Burdwan, Sylhet Beerbhoom, Assam, along Nerbudda.

(629) COMMIPHORA MADAGASCARENSIS. (*Lindl. Fl. Med.* 173).

*Syn.* Amyris Commiphora, *Roxb. Fl. Ind.* ii. 244.) Balsamodendron? Commiphora, (*Wight and Arnott, Prod.* i. p. 93.

This is a native of Sylhet, Assam, and Madagascar; it blossoms in the Botanic Garden of Calcutta about February and March, but seldom ripens its seeds. It has been briefly noticed under its synonym, in Cyclopædia.

A resinous substance named *Googul*, (Hind.) *Mooql* (Arab) is met with in all the Bazzars of India. It much resembles myrrh, and is said by some good authorities to constitute the bulk of the article exported from Bengal as East Indian myrrh. Royle considers the *Googul* identical with the Bdelium of commerce, and he ingeniously traces in *Budleyoon* and *Madelkon* (the Greek sononyms of Googul), the *βελλιον* and *μαδθαλον* of Dioscorides. A tree in the Seharunpore Garden, pointed out as the Googul tree, had scaly bark exactly conformable to Roxburgh's description of his Amyris.

*Bdelium*. Dr. Ainslie, vol. i. p. 29, gives an excellent summary of all the information extant when his work was published, regarding this interesting substance. He adduces as synonyms, for it, Kookool, *Tam.* Googooloo, *Tel.* Goo-gula, *Cin.* Aflatoon, *Arab.* Mukul, *Pers.* Goo-gul, *Hind.* known as bdelium. He describes the gum resin as semi-pellucid, yellowish, or brown, inodorous and brittle, softening between the fingers, in appearance not unlike myrrh, of bitterish taste, and rather strong smell. He states however that it is all brought from Arabia and Persia, where the tree is called *Durukht-i-mukul*. In the Bazzars of India it is said that the googul "comes from the hills." (*Royle.* p. 177.)

The medicinal properties of Bdelium are exactly like those of myrrh, and as it is much cheaper, it may be preferred for dispensary practice.—*O' Shaughnessy, page 237.*



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### (630) COMPASS.

Padoman, MALAY.

The Malay Compass is divided into sixteen parts, twelve of which are multiples of the four cardinal points. For the cardinal points the different nations have native terms; but for nautical purposes, those of the Malay language are used throughout, as in the case of the nations of Celebes, the most expert native navigators of the present day.—*Crawford's Des. Dic. of the Indian Islands*, p. 116.

(631) CONCHOLOGY OF SINGAPORE, being a few remarks on Conchology and Malachology comprising brief Notices of some of the more remarkable "Testacea" in Singapore and its neighbourhood; with an appended catalogue of Singapore shells arranged in conformity with "Lamarck's system."—By William Traill, M.D.

The author writes as follows: The shells of Singapore are found in three principal localities, in the sea, in fresh water, and on the land; the sea shells as might be anticipated, are most numerous, the list of fresh water shells is scanty, as there are here no natural sheets of water, no river entirely of fresh water, nor even a running stream deserving the name of a rivulet, so that, with exception of springs, the only water that has not a brackish taint, is that which accumulates in artificial drains, some of them of considerable extent, and intersecting the country in various directions. A considerable number of shells which are commonly described as inhabiting fresh, are found here in brackish water, and several of them in places that are overflowed by the sea at high tides; indeed the only kind I have hitherto found exclusively in fresh water is a species of *Planorbis* which I shall presently describe.

The land shells of this place are not numerous so far as can be ascertained. I have not met with more than 23 species, though doubtless others might be added, were their localities more easy of access. Several kinds of *Helix* and *Cyclostoma* appear to inhabit the depths of the forest, from whence it is almost impossible to procure them, the jungle being, for the most part, guarded by an interwoven mass of brushwood and prickly shrubs; several species have only been discovered, after the ground has been cleared by burning the trees and thus disclosing the half calcined remains of the shells.

It cannot fail to strike any one who pursues the study of conchology in this neighbourhood, that there is a remarkable paucity of the larger and more gaily coloured shells, which does not seem easily accounted for; the coast is extensive and varied, and is, apparently well adapted to the habits of life of Molluscous animals, there are numerous sheltered bays and inlets, with large tracts of level sand, and in other places, shelving rocks clothed in part with a variety of *Algæ*. It may, however, be questioned whether the geological formation of the coast is such

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as favours the growth of shells; so far as I can ascertain from the perusal of such recent works as I have met with naturalists are but imperfectly acquainted with the primary formation of the calcareous coverings of these animals: it is known that the membrane which is called the mantle of the animal, secretes a fluid more or less tenaceous, which gradually hardens into the consistence of shell, and the manner in which it is deposited, layer by layer, has been minutely described by authors, yet it is not known from whence the mineral substance is derived, or what change it undergoes to convert it into the material forming shell. It appears probable, however, that soluble salts, or other combinations of lime existing in the water, are absorbed into the body of the animal, and from thence by the proper ducts conveyed to the surface for the formation and nourishment of the shell. Should this be the case it might, *cæteris paribus*, be expected that shells of the largest size would be found where calcareous rocks fringe the coast, and vice versa, here indeed an explanation of the difficulty seems at hand, for there are no rocks of a calcareous nature in this neighbourhood: on the other hand, it is difficult to account for the immense extent and rapid growth of the Corallines which line the coast for many miles, and in the elegance of their forms, and variety of their species, almost vie with our land forests.

This description of animal vegetation, if it may be so called, appears also to obtain its nourishment by absorption from the sea water; and I consider it not altogether unlikely, that this constant and active process maintained by the Corallines may interfere with the growth of shells in their immediate neighbourhood. One evident cause of the scarcity of many species, is, that the poor Malays and Chinese use most kinds of shell fish as food, and search the shores for them with such diligence, that they have caused a dearth of such as are common in less frequented parts of the coast. Among the group of small islands 30 or 40 miles south of Singapore, where a human habitation is rarely seen, the general character of the shells is similar to those of Singapore, but they are more abundant and of larger size, particularly the genera *Hippopus*, *Tridacna*, *Spondylus* and *Chama*, which, especially the two latter, are much used as food by the natives.

I had lately an opportunity of visiting these islands, and repeatedly explored the coral reefs at low water, and thereby had the means of observing the habits of some of the Testacea to great advantage; among others, the *Voluta undulata*, the inhabitant of which is spotted with blotches of bright red on a dark ground, and readily catches the eye, at a distance of some yards, as it moves like a huge snail through the coral foliage; the *Voluta melo* also

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inhabits these seas inferior to the former in the markings of the animal, but more than equal to it in the rich tints of the shells. Of the class of Conchifera numerous species covered the rocks or were firmly attached to branches of coral; in particular I may mention a species of *Chama* fantastically branched like coral, and in the brilliancy of its yellow colour more resembling a flower than a shell. In several of the shallow bays, I observed an abundance of a small species of *Meleagrina* or Mother of Pearl Oyster, few of the shells were larger than the palm of the hand, and of a dark slate colour. I am informed by those who are accustomed to trade in Mother of Pearl, that this kind never attains a large size. I was at first inclined to doubt the accuracy of the statement, as I do not find more than two described species, namely, the *M. margaritifera*, and *M. albina* which is also to be found here. What leads to the supposition of its being a distinct species is that the large kind has never been picked up here.

It is worthy of remark, that among the shells of these latitudes, in common with those of all tropical climates, it is rare to find a single species that is identical with any found in the north of Europe, and it is observable that the few such shells, that are found native here, are not of the more common kinds. On the contrary they are comparatively rare in both latitudes. The difference in the temperature of the seas does not seem sufficient to account for this disparity, nor does it seem probable that atmospheric vicissitudes would much affect creatures so independent of vital air: whether it may be owing to the want of some particular food, I am unable to determine. Of the species found in both latitudes may be mentioned *Chiton marginatus*, *Emarginula fissura*, *Fissurella graeca*, *Arca tetragona*, *Natica castanea*, and a species closely resembling *Trivia europaea*.

It has been already observed that the poorer natives have frequent recourse to shell fish as food, a few kinds however, are esteemed delicacies and are frequently exposed for sale in the market; of these may be enumerated *Arca granosa*, (the shell of which somewhat resembles our common cockle) *Corbicula regia* or *Cyrena* of Lamarck, *Gerithium lineolatum* of Gray, and *Voluta melo*, though the latter is not always procurable. Among the eatable shell fish, the Oyster must not be omitted, though it is for the most part lightly esteemed by the natives, who generally prefer such kinds as have stronger taste. A variety of Oysters may be found here but all are not eatable, two species in particular are of considerable size, and excellent flavour, though found in very different localities. The one kind is abundant at Pedro Branca, a large rock at the entrance to the China Seas, where they are exposed to rapid

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currents and stormy waves; here they are, invariably found strongly adherent to the rock by the surface of the lower valve. The other kind is procured from the mouth of the Moar river, between Malacca and Singapore. These being comparatively safe from the effects of storms and currents are never fixed to rocks but lie loose in the mud, in beds of considerable extent. Although Oysters are so numerous in both these places, it is rare to find any other species of shell in their immediate vicinity, a circumstance that has been remarked of Oyster beds in England and other places.

It must be allowed that discrimination between species and varieties among shells is extremely perplexing, the shades of difference between one species and another often appear less than between two varieties of the same species, the marks of distinction are often so modified by various causes, as difference in locality, change of food, &c., that uniformity of colour, size or even shape, when taken separately, are no safe guides, and unfortunately they are not always found combined. Blumenbach wisely observes that "no general rule can be laid down for determining the distinctness of species, as there is no particular class of characters which can serve as a criterion."

This variable tendency does not prevail in all shells, though some kinds are very liable to it, particularly the genus *Nassa*, many species of which are common here. In illustration of this property of change, I shall describe a species of *Nassa* found in the mud of salt swamps: it is in colour a dark brown or black, about an inch and a half in length, the outer whorl is smooth, those next the apex of the spire are furrowed longitudinally, and it possesses the usual generic mark of a prominent plait at the upper part of the aperture. Out of many specimens examined I have observed none to deviate from the above description. In the same localities may be found another shell quite similar to the other in form and colour, but not more than half its length, possessing however all the marks of a full grown shell, and as no shells of intermediate size are to be met with, there seems good reason to believe them two distinct species. The following instance is however more remarkable in connexion with the above. I lately found at Malacca a species of *Nassa* of a pale flesh colour, barred with brown, about a third of an inch in length, and little more than a grain in weight. In the same neighbourhood I met with another specimen, three quarters of an inch in length, and weighing between four and five grains. As in the former case, the two shells were exactly similar in shape and colour, though very different in size and weight, and as both had the marks of having attained their full size, was ready to believe that I had obtained two



new species; a further search however, put me in possession of fifteen additional specimens, similarly marked but all of them intermediate to the two first in size and weight; in fact the whole seventeen formed an almost imperceptible scale of gradation, sufficiently proving that they were so many varieties of one and the same species. I have observed several kinds of *Nassa* particularly abundant in the neighbourhood of the Fish Markets, where they may be seen in numbers feeding on dead fish and other animal food. This artificial mode of subsistence is possibly one cause of their variable form and size, as it is well known that domestic animals, and others that are more or less dependent on man of their support, are very apt to produce a progeny differing more or less from the parent stock. A good example of the propagation of an accidental variety, must be familiar to my readers in the instance of a well-known domestic animal of the feline genus, which in Singapore is rarely seen with a perfect tail. In the neighbourhood of Fish Markets may also be seen multitudes of dead shells of all sizes, some so minute as to be microscopic, and all tenanted by *Paguri* or Hermit crabs, as varied in size as the shells they inhabit, and like the *Nassa*, busily engaged in devouring fragments of dead fish, which is their principal food. I make mention of them here as a parallel instance of the effect of artificial life upon some of the lower animals, for these crabs are not, as might be supposed, one, or at most, two or three, species in different stages of growth. If an examination be made, it will be found that individuals of all sizes are laden with spawn, not excepting such as are so minute that their forms are not to be distinguished by the naked eye, it cannot be imagined that each of these is a different species, they are in fact an evident instance of the alteration of a species into an almost infinite number of varieties.

Of the various localities in which the Singapore shells are found, one remains to be mentioned, to describe which intelligibly, I must briefly advert to the general form of the island of Singapore. It consists of a cluster of low undulating hills based on an extensive plain having a uniform level surface, in some places not varying above two or three feet, in an area of several square miles. The whole of this valley ground is but little raised above the level of the sea, as is shewn by the salt water penetrating for miles into the interior of the island, and at spring tides, even overflowing cultivated fields. Over some parts of this low ground there is a layer of decomposed vegetable matter of variable depth, but for the most part the surface is sand, beneath which, at depths varying from 5 to 50 feet, there is a dark blue plastic clay abounding in shells, and these not of the kinds found in Mangrove swamps, but such as are common in open sandy bays or straits. After a careful ex-

amination, I cannot pronounce any to be different from those found in the adjacent seas; the forms of most of them are perfect, and in a few the colour is preserved, but they have for the most part lost their hardness, being readily crushed between the fingers. The kinds most abundant are as follows: *Placenta placuna*, *Strombus incisus*, *S. labiosus*, several species of *Nassa*, *Columbella*, *Trochus*, *Cerithium*, *Mitra*, *Turritella*, *Dentalium Aspergillum*, *Area*, *Venus*, *Corbula*, *Tellina* and others. I am informed by Mr. Thomson, the Government Surveyor, that wherever he has had occasion to make excavations in the low ground of Singapore, similar appearances present themselves, that in all the brick pits the clay is of the same description and also contains shells, moreover that in the Kallang valley, corals similar to existing species are to be found at the depth of six feet; add to this the fact that the growth of coral is early diminishing the depth of water in the neighbourhood, a good example of which is seen at the entrance to New Harbour where there is a small peaked island, between which and Singapore the coral has grown so rapidly that it is thought the island will in a very few years form a part of Singapore; taking therefore all these circumstances into consideration I conceive that the existence of shells in such situations may be rationally accounted for on the supposition that most of the valley ground of Singapore was originally sea, and has been altered and adapted to the use of man, chiefly, if not solely through the agency of coral.

Most of the shells in the annexed list may be found described in any work of reference on this subject. I shall therefore merely notice individually a few whose exterior forms, or the peculiar habits of their inhabitants, are not, so far as I am aware, very generally known.

The *Magilus antiquus* has lately been found north of Penang in the neighbourhood of Junk Ceylon, the natives set some value on them, and occasionally wear them as ornaments; the shell is singular and apt to be mistaken for a petrification, being dense in structure, diaphanous, and much like alabaster. It has been often figured and described by naturalists, but the animal inhabiting it is I believe unknown, unless described in some very recent publications: it is supposed to be a Gasteropod, though this is rather doubtful, as the shell is said to be generally found imbedded in coral or madreporæ: It is probable that this point might be satisfactorily settled by a careful examination of the above locality. Among other interesting discoveries lately made on that part of the coast, is a layer or stratum of grey limestone, of considerable extent, composed almost entirely of petrified shells. I have been fortunate enough to obtain a specimen for examination which contains three distinct species, apparently fresh

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water shells; two of them I have never seen recent here, but the third closely resembles a small *Melania* common here in stagnant ditches, their size, number of whorls, and general shape are the same, and they have both deep longitudinal striae or furrows; some of the shells were crystalline and amber coloured, though the material uniting them was of a uniform grey colour, both substances however were soluble in Hydrochloric acid.

Of the numerous class of shells inhabiting the interior of madrepores, wood, and stone, there is a species allied to "*Pholas*" which I cannot find described in any English work, though it seems to answer the description of the Genus *Jouannetia* of M. DesMoulins in a work entitled "*Manuel des Mollusques par M. Lander Range*" the shell is white, rather less than a musket ball, and nearly as globular in form, with a slight caudiform appendage at one end, striated obliquely and having accessory pieces, the consistence of the shell more resembles that of the bivalve of the "*Teredo*" than a *Pholas* and M. DesMoulins considers it to hold a place between these two genera. The specimens I have met with were in the interior of rolled masses of "madrapore" and were evidently old, as none contained the animal alive or dead. The "*Lima*" or the "file shell" of which several species are found in the straits, much resembles the genus "*Pecten*" or "scallop shell" which is well known to possess greater power of locomotion than most Bivalves. This power is possessed even in a greater degree by the *Lima*. When in the water its movements are graceful, the two valves being used as fins by means of which it swims with considerable rapidity guiding itself by its numerous tentacula which are frequently of an orange colour and arranged not unlike the petals of a flower, the shell is less curved than the scallop, and generally white, the valves do not entirely close.

The *Parmaphora* or Ducks bill Limpet is found here, though by no means a common shell, it is like a *Patella* flattened and elongated, the anterior edge always widely notched, apex slightly recurved, length from one to two inches, colour white; the body of the animal is much more bulky than the shell, and the mantle is so capacious that it covers the whole shell except the apex, which enables it in some degree to elude search, as it appears more like a pulpy or spongy mass than a shell; when touched, the mantle stains the hand a dark purple colour.

There is a species of *Planorbis* or shell allied to *Planorbis* found here in pools of fresh water, being the only species of Singapore shell that is found solely in fresh water; the outer whorl is little more than a quarter of an inch in diameter, aperture of the shell more diagonal than is usual in *Planorbis* so that when the animal moves on a plain surface the convex side of the

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shell is always uppermost whereas the animal of *Planorbis* is described as carrying its shell erect or with the diameter perpendicular; colour of the shell pale amber, no operculum, animal nearly black, mouth vertically cleft, no perceptible neck, (in the animal of *Planorbis*, the neck is said to be elongated) eyes at the base of two blunt tentacula in which also it differs from *Planorbis* which is commonly described and figured as having two subulate tentacula: the animal possesses in a considerable degree, the power of gliding through the water, apparently in search of food, with its shell entirely submerged and its smooth foot in close opposition with the surface of the water, locomotion being effected, by causing the flat part of the shell to act on the water in the manner of a fin, the head of the animal being at the same time, directed forward so as to regulate its movements; the animal does not occupy so much as half the shell, and the remaining space frequently contains air, which the inhabitant has the power of expelling at pleasure.

The Genus "*Natica*" of which there are several elegant species in Singapore, is known from the "*Nerita*" or "hoof shell" by being umbilicated, more rounded in form, and the interior not toothed, the shell has been also described as having no epidermis; to this rule however, there are marked exceptions, two of the species native here, having a strongly adherent epidermis.

In Swainson's Malacology there is a species figured as an extraordinary animal, much larger than the shell it is supposed to inhabit, one of the species found here presents the same appearance in a remarkable degree; and the phenomenon is caused in the following manner: the interior of the foot of the animal, is of a loose cellular texture, which it has the power of distending with water so as to be more than three times the bulk of the shell, but on the approach of danger it can instantly reject the water, assuming its natural size, and retreat into its shell closing after it the operculum which being of stony hardness, secures it from the attack of ordinary foes. This mechanism doubtless assists the progress of the animal through sand in which it frequently burrows.

The *Cerithium lineolatum* of "Gray" has been already alluded to, there are two shells of this Genus, neither of which I have seen described though I observed one of them named as above in a collection of the land and fresh water shells of Penang, made by Dr. Cantor, the shell so designated is about an inch and a half in length, thin and fragile, of a brown colour, with obscure transverse bands of a lighter hue, aperture more rounded than is usual in the Genus *Cerithium*, spire always truncated in the full grown shell, head and anterior part of the animal bright red like coral: the other species which I have more



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particularly observed in Singapore, has rather a larger shell, thinner and more fragile than the other and of a darker colour, the animal is brown or nearly black and like the former, the spire of the full grown shell is always decollated; young specimens of the shell have perfect, sharp pointed spires, and the convoluted extremity of the animal then entirely fills the spiral part of the shell, but as the animal increases in size, its posterior extremity becomes more blunted and gradually retreats towards the anterior part of the shell, and as it successively abandons each turn of the spire, it throws out a viscid secretion which forms a hard shelly partition between its new situation and the disused extremity of the spire, which being deprived of its usual nourishment, soon becomes worn into holes and finally drops off: thus the shell when arrived at maturity has always the appearance of being imperfect. The habits of the animal are mixed and peculiar; sometimes it may be seen in a half torpid state, the operculum firmly closed suspended by a glistening thread, from the branch of a tree; when in motion it leaves behind it, a shining track like that of a snail; at the sides of an elongated proboscis are two tentacula, apparently short, blunt, and with eyes at their extremities: now as the Genus *Cerithium* is described as having the eyes at the base of the tentacula, this would appear a very remarkable deviation, and I was disposed to consider it as such until I had an opportunity of remarking the movements of the animal in water, where it is as often found as on land. When closely observed in that element, it is seen to expand two slender, pointed, tentacula of so delicate a structure that when out of the water they are lax, flaccid, and doubled under the protuberant eye, so as to be almost invisible. The shell has been found in running streams but more commonly in the brackish water of canals or ditches.

The very numerous genus of "*Cypræa*," or the "Cowry" shell is too well known to require a formal description, the largest species found here is the "*Cypræa tigris*" which is prettily spotted with black, it is frequently made into snuff boxes in England, the animals of several have been described and figured by authors. The mantle is so large as to cover all the shell, on the back of which there is often a longitudinal line which marks where its two folds meet: this membrane continually secretes an abundance of viscid fluid which lubricates the shell, and preserves the beautiful polish which has procured for them the name of porcelain shells. I shall only make particular mention of two kinds, the young or spawn of which I have been fortunate enough to obtain in their earliest stage of existence.

The "*Cypræa olivacea*" is the most abundant of the Singapore Cowries being found on most beaches under flat stones, it is of the size and

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much the colour of an olive except that the back is generally mottled with brown and the mouth somewhat yellow; the specimen which I found with the young attached, was fixed in the usual manner, to the lower surface of a stone, on raising it there was found adhering to it, a flat circular membrane broader than the shell, transparent, and dotted with minute grey spots like grains of sand, on placing the substance in a glass of sea water, numbers of the grains dropped out of the membranous mass to the bottom of the glass and immediately assumed rapid and lively movements, some revolving in a rotatory manner, others alternately rising and sinking in the water or sporting over its surface. On a closer examination these grains were seen to be in reality shells, some hundreds in number, nearly transparent, having no perceptible columella and apparently consisting of a single coil or whorl, aperture round, breadth of the shell greater than the length, so that, when on a plain surface it rested on either end like a *Planorbis* or *Nautilus*, the animal effected these rapid movements by the alternate contraction and expansion of its foot which was broad and expanded and much larger than the shell, into which it seemed to have no power of withdrawing it.

There is another small Cowry occasionally found on the coast, resembling in colour the *C. adusta*, but not more than half the size and less cylindrical in shape: Captain Congalton, of the H. C. Steamer "Hooghly," sent me one that was lately fished up in "ten fathom" water near Sultan's Shoal to the westward of Singapore, that shell was partially imbedded in a species of sponge, on detaching it from which, I found the cavity of the spongy mass lined with the young fry of the *Cypræa*, differing however in several respects from that of the *C. olivacea*;—instead of being contained in one membranaceous envelope there were above two hundred transparent sacs not larger than grains of mustard seed and each containing about 30 shells so minute that they could not be distinguished without the aid of a microscope, at a moderate computation there could not have been less than six thousand young shells: the difference in size is remarkable, as the *Cypræa olivacea* which had the largest offspring is a much smaller shell than the one at present under consideration: in this case I had not an opportunity of studying their habits &c. as the animals were dead, having been many hours out of the water; when examined under a microscope the shape of the shell was found to resemble exactly that of the young *C. olivacea* above described.

On various parts of the coast, particularly on Coral banks, a considerable number of *Echini* may be observed, which (although Naturalists have separated them from the Testaceous Mollusca) it may not be out of place to mention here; one species in particular I cannot find to have

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been hitherto described; the shell is spheroidal, flattened, not more than two inches in diameter and of a dark purple colour, the species are numerous, six or eight inches long, black, very slender and sharp pointed and somewhat elastic; the animal is found along the edges of Coral reefs, and moves with tolerable rapidity by means of its spines, when closely pursued it has the faculty of darting itself forward against its opponent and thereby inflicting considerable injury with its sharp spines, the points of which often break off and remain in the wound.

The foregoing remarks may in some measure suffice to shew what a wide field this country presents to those who have leisure or inclination to prosecute this branch of Natural History:

Catalogue of the shells of Singapore and its vicinity. The Genera arranged as nearly as possible in conformity with Lamarck's System.

## I. CLASS ANNELIDES.

Arenicola.....	1 Species	M. spengleri and two others.....	2 Species
Siliquaria.....	1 "	Crassatella.....	1 "
S. anguina.....	3 "	Amphidesma.....	3 "
Dentalium.....	3 "	Corbula.....	3 "
D. elephantinum,		Saxicava.....	3 "
D. entale and another.....		Petricola.....	3 "
Sabellaria.....	1 "	Psammobia.....	2 "
Terebella.....	1 "	Tellina.....	19 "
T. conchilega.....	4 "	T. radiata.....	
Spirorbis.....	4 "	T. virgata.....	
S. nautiloides.....		T. spengleri.....	
S. Carinata.....		T. rostrata.....	
S. spirillum.....		T. lanceolata.....	
S. lamellosa.....		T. lingua-felix.....	
Serpula.....	1 "	T. rugosa.....	
S. decussata.....	1 "	T. gargadia and eleven others.....	
Vermilia.....	1 "	Lucina.....	3 "
V. tricostralis.....	1 "	Donax.....	2 "
Magilus.....	1 "	Crassina.....	3 "
M. antiquus.....		Corbicula.....	1 "

## II. CLASS CIRRHIPEDES.

Balanus.....	3 "	Cytherea.....	8 "
B. tintinnabulum and two others.....		C. seripa.....	
Creusia.....	1 "	C. picta and six others.....	
Anatifera.....	1 "	Venus.....	12 "
A. levis.....	1 "	V. squamosa.....	
Otion.....	1 "	V. casina.....	
		V. decussata and nine others.....	

## III. CLASS CONCHIFERA-

Aspergillum.....	1 "	Genus Cardium.....	9 "
A. javanum.....	1 "	C. cardissa.....	
Fistularia.....	1 "	C. hemicardium.....	
F. clava.....	2 "	O. papyraceum.....	
F. redo.....	2 "	C. unedo.....	
T. navalis and another.....		C. flavum.....	
Pholas.....	4 "	C. exiguum.....	
P. orientalis.....	4 "	C. humanum.....	
P. striatus and two others.....		C. ciliare and another.....	
Jouannetia.....	1 "	Cardita.....	2 "
Gastrochaena.....	1 "	C. caliculata and another.....	
Solon.....	8 "	Cypriocardia.....	2 "
S. vagina.....	3 "	Arca.....	13 "
S. ciliellus and six others.....		A. tortuosa.....	
Mya.....	3 "	A. semitorta.....	
M. truncata and two others.....		A. tetragona.....	
Anatina.....	1 "	A. navicularis.....	
A. hispidula.....	1 "	A. barbata.....	
Lutraria.....	1 "	A. cancellaria.....	
Mactra.....	3 "	A. antiquata.....	
		A. granosa and five others.....	
		Nucula.....	1 "

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Hyria.....	1 Species	Bulinus.....	Species.
Chama.....	3 "	B. citrinus and another.....	11 "
C. lazarus and two others.....		Anricula.....	11 "
Tridacna.....	3 "	A. midoe.....	
T. gigas.....		A. juda.....	
T. crocea.....		A. nyosotis.....	
T. squamosa.....		A. minima.....	
Hippopus.....	2 "	A. scarabaeus and six others.....	
H. maculatus and another.....		Cyclostoma.....	2 "
Mytilus.....	6 "	C. involutus and another.....	
M. bilocularis.....		Planorbis.....	1 "
M. perna and four others.....		Lymnaea.....	1 "
Modiola.....	3 "	Melania.....	2 "
Pinna.....	4 "	Valvata.....	2 "
P. pectinata.....		Paludina.....	7 "
P. flabellum.....		Ampullaria.....	1 "
P. squamosa and another.....		Neritina.....	2 "
Perna.....	3 "	Navicella.....	1 "
P. vulsellata.....		Nerita.....	7 "
P. ephippium.....		N. peloronta.....	
P. femoralis.....		N. polita.....	
Malleus.....	4 "	N. versicolor.....	
M. vulgaris.....		N. albicilla.....	
M. albus.....		N. chlorostoma.....	
M. vulsellatus.....		N. atrata and another.....	
M. normalis.....		Natica.....	15 "
Avicula.....	2 "	N. mamilla and fourteen others.....	
Melcaginia.....	2 "	Sigaretus.....	7 "
Lima.....	4 "	Stomatia.....	1 "
L. squamosa.....		S. phymotis.....	
L. inflata.....		Haliotis.....	1 "
L. fragilis.....		Tornatella.....	4 "
L. linguatula.....		T. flammea.....	
Pecten.....	7 "	T. solidula and two others.....	
P. pleuronectes.....		Truncatella.....	1 "
P. sinuosus.....		Pyramidella.....	5 "
P. rostellum.....		P. terebellum and four others.....	
P. flavidulus.....		Scalaria.....	4 "
P. varius and two others.....		S. lamellosa.....	
Plicatula.....	2 "	S. varicosa.....	
P. dipressa.....	2 "	S. coronata and another.....	
P. ramosa.....		Delphinula.....	3 "
Spondylus.....	3 "	D. laciniata.....	
S. galearopus and two others.....		D. turbinopsis & another.....	
Ostrea.....	9 "	Solarium.....	1 "
O. edulis.....		S. perspectrum.....	
O. imbricata.....		Trochas.....	13 "
O. folium.....		T. rotularius.....	
O. crista galli and five others.....		T. viridis.....	
Vulsella.....	1 "	T. granulatus.....	
V. linguatula.....		T. niloticus and nine others.....	
Placuna.....	3 "	Monodonta.....	5 "
P. placenta and another.....		M. labio and four others.....	
Anomia.....	3 "	Turbo.....	7 "
A. ephippium and two others.....		T. cochlus and six others.....	

## IV. CLASS MOLLUSCA.

Hyalea.....	1 Species.	Planaxis.....	1 "
Chiton.....	2 "	P. sulcata.....	
Patella.....	4 "	Turritella.....	1 "
Parmophora.....	1 "	Cerithium.....	29 "
Emarginula.....	1 "	C. petrosum.....	
Fissura.....	1 "	C. asperum.....	
Fissurella.....	1 "	C. zonale.....	
Calyptraea.....	2 "	C. aluco.....	
Bulla.....	6 "	C. vertagus.....	
B. naucum.....		C. telescopium.....	
B. ampulla and four others.....		C. palustre.....	
Onchidium.....	1 "	C. obtusum.....	
Helix.....	7 "	C. nodulosum and twenty others.....	
H. tectiformis and six others.....		Triphora.....	1 "
Pupa.....	1 "	Pleurotoma.....	11 "



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P. nodifera.....	Species.	T. strigillata and another.....	
P. pleurotoma & nine others.....		Columbella.....	3 Species
Turbinella.....	1	C. rustica.....	
Cancellaria.....	1	C. fulgurans.....	
Pyrala.....	2	C. mercatoria.....	
P. rapa.....		C. hebraea & three others.....	
P. flexus.....		Murex.....	14
P. elongata and four others.....		Voluta.....	2
Ranella.....	3	V. undulata.....	
R. spinosa and two others.....		V. melo.....	
Murex.....	4	Marginella.....	5
M. saxatilis.....		Ovula.....	4
M. crassispina.....		O. verrucosa.....	
M. adustus and three others.....		O. triticea and two others.....	
Pteroceras.....	3	Cyprea.....	20
P. chiragra.....		C. circercula.....	
P. lambris and another.....		C. quadrimaculata	
Strombus.....	7	C. moneta.....	
S. cancellatus.....		C. urechus.....	
S. auris diumae.....		C. annulus.....	
S. luhmanus.....		C. erosus.....	
S. labiosus.....		C. zigzag.....	
S. incanus & two others.....		C. caput-serpentis	
Cassidaria.....	1	C. poraria.....	
Cassis.....	1	C. olivacea.....	
C. glauca.....		C. adusta.....	
Purpura.....	9	C. arabica.....	
P. armigera and eight others.....		C. tigris and seven others.....	
Dolium.....	1	Trivia.....	1
D. maculatum.....		Oliva.....	2
Buccinum.....	6	Conus.....	6
Nassa.....	24	C. praelatus.....	
Terebra.....	3	C. marmoreus and four others.....	
T. maculata.....		Nautilus.....	1
		N. pompilius.....	
		Argonauta.....	1
		A. argo.....	

N. B.—In addition to the Shells above enumerated there are ten or twelve kinds for which I cannot find a place among Lamarck's Genus.—*Journ. Ind. Arch. Vol. 1, No. 5. page from 227 to 241 Nov. 1847.*

## BIRMAH AND THE TENASSERIM PROVINCES.

*Notes on the distribution of some of the land and freshwater Shells of India: Part I.—By W. THEOBALD, Jun.*

Mr. Theobald remarks as follows: In the present paper it is my intention to give a sketch of the distribution of the land and fluviatile shells of certain portions of India, as far as they have been observed, in the hope that my notes may prove a not uninteresting addition to our previous knowledge of the subject, and shew by the great addition now made to the list of known species, how much yet remains to be done in this department of Natural History.

The names used are with scarcely an exception those furnished by Mr. Benson, who has described many of the new species in the *Annals and Magazine of Natural History* for 1857 though many still possess merely MSS. names, which, together with the new species described from specimens furnished by me, I have indicated in the following list, by asterisks (\*).

On my first communicating with Mr. Benson, he informed me that but twenty-three species of land shells were authentically known from the Tenasserim Provinces. Of these, four species,

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which escaped my notice, may here be mentioned to complete the list up to the present time, viz.

*Vitrina Birmanica*, Philippi.  
*Bulimus moniliferus*, Gould.  
*Cyclophorus perdix*, Sav.  
*Leptopoma Birmanum*, Pfr.

## CYCLOSTOMIDE.

### *Pterocyclos. Benson.*

- \* *P. pallatus*, B.—Akowtong (on the Irrawaddy R.) Not uncommon.
- \* *P. cetra*, B.—Maulmein and Phaiethan (on the Tenasserim R.) Not common.

### *Cyclophorus. Montfort.*

- C. aurantiacus*, Schum.—Tenasserim valley, not common.
- \* *C. Theobaldianus*, B.—Tenasserim valley, Maulmein, Thaitinio. This shell is nowhere common. In the Tenasserim valley it equals *C. aurantiacus* in size, but is easily distinguished by its more depressed form, colourless peristome, and flexuous striation. It has the greatest range of any Cyclostomatous shell of the provinces.
- \* *C. Haughtoni*, mihl.—n. s. Testa, simili *C. aurantiace*, solida nitidiuscula; carinata, superne saturate castanea; in decorticatis speciminibus, spira libris albidis zigzag variegata. Carina, catenata alternate albida et castanea. Periomphalo albido, fasciis nonnullis castaneis spiralisbus lineato. Peristomate vix pallidissime ochraceo, ore interiori caerulecente—Maulmein.

Size  $\frac{1.70 \text{ Major}}{1.35 \text{ Minor}}$  diameter in inches. This shell

I have much pleasure in naming after Captain Haughton, to whom I am indebted for some fine shells. It occurs abundantly at the "farm caves," and is at once distinguished from all other Tenasserim Cyclophori, by its parti-coloured funiculate keel, which is not the result of abrasion but is best seen in specimens covered by the epidermis.

- C. expansus*, Pfr.—Tenasserim valley. Not rare. This shell varies much in size, from  $\frac{1.70}{1.26}$  to  $\frac{0.80}{0.65}$

- \* *C. affinis*, mihl.—n. s. Testa, subglobosoturbinata, umbilicata, solidiuscula, castaneo-marmorata, haud nitida, vix carinata, peristomate reflexo, forti, expansiusculo-distorto, pallidissime flavescete, intus caerulecente  $\frac{1.60}{1.36}$  to  $\frac{1.40}{1.12}$

—Maulmein. This shell has no very marked character, unless a distortion in the peristome, one-third from its sutural margin, should prove constant. But two specimens were obtained, of which the measurements are given above.

- C. fulguratus*, Pfr.—Thaïet-mio, Rangoon, very common. This fine shell is not rare at Rangoon and becomes very abundant near Thaïet.

## CONCHOLOGY OF BIRMAH.

mio. It varies much in size and colour, some specimens are almost colourless  $\frac{1.80}{1.30}$  to  $\frac{1.03}{0.85}$

9.\* *C. cryptomphalus*, B.—Ava. Procured by Mr. Oldham, does not seem to be a plentiful species.

10.\* *C. scurra*, B.—Pegu (province).

11.\* *C. balteatus*, B.—Pegu (province).

12.\* *C. scissimargo*, B.—Pha'ethan. Not common.

13.\* *C. calyx*, B.—Akowtong, on the Irrawaddee: not common.

14.\* *C. cornu-venatorium*, Sav.—Ava. Procured by Mr. Oldham.

15.\* *C. perdis*, Sav. (Not obtained by me.)

### *Leptopoma. Pfeiffer.*

16.\* *L. aspirans*, B.—Tenasserim valley, very common.

17. *L. Birmanum*, Pfr. — (Not noticed by me.)

### *Alycaeus. Gray.*

18.\* *A. pyramidalis*, B.—Therabuin hill, near the Tenasserim river. This pretty little shell appears confined to Therabuin Hill, where it is not very common. It is of a delicate pink tint.

19.\* *A. amphora*, B.—Maulmein and Tenasserim valley. Rare.

20.\* *A. umbonalis*, B.—Akowtong. Not rare.

21.\* *A. sculptilis*, B.—Thaïet-mio. Rare.

22.\* *A. armillatus*, B.—Thaïet-mio. Rare.

### *Megalomastoma. Guilding.*

23.\* *M. gravidum*, B.—Maulmein. Very common.

24. *M. sectilabre*, Gould.—Yanglaw, on the Tenasserim. Very rare.

### *Rhaphaulus. Pfeiffer.*

25. *R. chrysalis*, Pfr.—Maulmein. Very rare.

### *Pupina. Vignard.*

26.\* *P. arula*, B.—Yanglaw, very rare. Among dead leaves.

27.\* *P. artata*, B.—Maulmein. Not uncommon, among dead leaves and rubbish at the foot of rocks. By the habitat "Maulmein" the "Farm caves" in limestone hills a few miles distant are intended.

### *Otopoma. Gray.*

28.\* *O. blennus*, B.—Maulmein. Rare.

### *Hydrocena. Parreyss.*

29.\* *H. illex*, B.—Pha'ethan. Not rare. On the bare face of limestone rocks.

30.\* *H. pyxis*, B.—Thaïet-mio. Not rare, under stones.

31.\* *H. frustrillum*, B.—Ava. Procured abundantly by Mr. Oldham.

## CONCHOLOGY OF BIRMAH.

Tabular view of the distribution of the Cyclostomidae in Birman and the Tenasserim Provinces.

	Ava.	Thaïet-mio.	Akowtong.	Rangoon.	Maulmein.	Tenasserim valley.
<i>Cyclophorus cornu venatorium</i> Sav.	*	*	*	*	*	*
" <i>cryptomphalus</i> B.	*	*	*	*	*	*
" <i>fulguratus</i> Pfr.	*	*	*	*	*	*
" <i>calyx</i> B.	*	*	*	*	*	*
" <i>Theobaldianus</i> , B.	*	*	*	*	*	*
" <i>Haughtoni</i> , milt.	*	*	*	*	*	*
" <i>affinis</i> , milt.	*	*	*	*	*	*
" <i>scurra</i> , B.	*	*	*	*	*	*
" <i>balteatus</i> , P.	*	*	*	*	*	*
" <i>aurantiacus</i> , Schurr.	*	*	*	*	*	*
" <i>expansus</i> , Pfr.	*	*	*	*	*	*
" <i>scissimargo</i> , B.	*	*	*	*	*	*
" <i>Alycaeus sculptilis</i> , B.	*	*	*	*	*	*
" <i>armillatus</i> , B.	*	*	*	*	*	*
" <i>umbonalis</i> , B.	*	*	*	*	*	*
" <i>amphora</i> , B.	*	*	*	*	*	*
" <i>pyramidalis</i> , B.	*	*	*	*	*	*
<i>Hydrocena frustrillum</i> , B.	*	*	*	*	*	*
" <i>pyxis</i> , B.	*	*	*	*	*	*
" <i>illex</i> B.	*	*	*	*	*	*
<i>Rhaphaulus chrysalis</i> , Pfr.	*	*	*	*	*	*
" <i>Megalomastoma gravidum</i> B.	*	*	*	*	*	*
" <i>sectilabre</i> Gould.	*	*	*	*	*	*
" <i>Pupina artata</i> B.	*	*	*	*	*	*
" <i>arula</i> B.	*	*	*	*	*	*
" <i>Pterocyclos pullatus</i> B.	*	*	*	*	*	*
" <i>ectia</i> , B.	*	*	*	*	*	*
" <i>Leptopoma aspirans</i> B.	*	*	*	*	*	*
" <i>Otopoma blennus</i> B.	*	*	*	*	*	*

### *Helix. L.*

1.\* *H. Oldhami*, B.—Ava. Procured by Mr. Oldham.

2.\* *H. sculpturita*, B.—Ava. What appears to be a small variety of the same shell occurs at Thaïet-mio, and nearly approaches *H. similis*, Fer. in aspect, though larger.

3.\* *H. bolus*, B.—Thaïet-mio. Very abundant at Thaïet-mio, Prome, Henzada, &c.

4.\* *H. paucillula*, B.—Thaïet-mio, where this minute helix is rare.

5.\* *H. mensula*, B.—Thaïet-mio. Rare.

6.\* *H. hariola*, B.—Thaïet-mio. Rather rare. Inhabits Acacia trees in jungle.

7.\* *H. petila*, B.—Thaïet-mio. Rare.

8.\* *H. refuga*, Gould.—Thaïet-mio and Akowtong. Not very rare.

9.\* *H. pausa*, B.—Akowtong. Not common. Found in gardens on Areca Palms, &c.

10. *H. rotatoria*, V. de Busch.—Akowtong. Very common, found in company with the last. This shell is rarely distinguishable from the Sylhet *H. tapeiria*, B. By the aid of a lens however the sculpture is found to be more ornate and flexuous, whilst in the latter it is simply striate.

11.\* *H. textrina*, B.—Henzada. Common in jungle. The adult shell has a very handsome pellucid appearance. In the rains the foot is too large for immediate retraction.

12.\* *H. molecula*, B.—Rangoon. This little species abounds on the Great Pagoda.

13. *H. achatina*, Gray.—Maulmein. Very abundant.

14.\* *H. bombax*, B.—Maulmein. Rather rare.

15. *H. honesta*, Gould.—Maulmein. Tenasserim valley. Rather common.

16. *H. Merguiensis*, Philippi.—Maulmein.



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Tenasserim valley. Common. Seems a var. of the next species.

17. *H. Gabata*, Gould.—Maulmein. Mergui. Common.

18.\* *H. capessens*, B.—Maulmein. Not very rare.

19.\* *H. infrendens*, B.—Maulmein. Not very rare.

20.\* *H. Pylaica*, B.—Maulmein. Not uncommon. This curious little shell resembles the American *H. hirsuta*.

21.\* *H. catinus*, B.—Maulmein. Very rare.

22.\* *H. cassidula*, B.—Maulmein. Rare.

23. *H. delibrata*, B. (*H. procumbens*, Gould)—Maulmein. Tenasserim valley. Nowhere common. This species has a very wide range, being also found near Cherra.

24. *H. refuga* var. *dextrorsa*.—Phaiethan. This dextral var. was only met with at one spot in the Tenasserim valley, where it was not rare; it is curious that *H. refuga* does not occur in the valley, but was first seen at Akowtong.

25. *H. castra*, B.—Pija. Rare. A single specimen of this Darjiling shell was found at Pija between Tavoy and Mergui.

26.\* *H. ategia*, B.—Phaiethan. Not common.

27.\* *H. arx*, B.—Therabuin Hill. Rare. This hill has afforded many singular forms, nowhere else met with.

28.\* *H. convallata*, B.—Therabuin Hill. Rare. Another singular shell also met with near Pija on the coast between Mergui and Tavoy.

29.\* *H. biforcata*, B.—Therabuin Hill. A most singular shell, of which but one adult specimen was procured.

30.\* *H. ceryx*, B.—Phaiethan Hill. Rare.

31.\* *H. artificiosa*, B.—Phaiethan. Not rare, but nowhere else found.

32.\* *H. causia*, B.—Phaiethan. Rare.

33.\* *H. forabilis*, B.—Phaiethan. Very rare.

34.\* *H. perpaula*, B.—Phaiethan. Very rare.

35.\* *H. levicula*, B.—Phaiethan. Rare.

36.\* *H. petasus*, B.—Phaiethan. Not rare.

37.\* *H. precaria*, B.—Phaiethan. Very rare.

38. *H. Saturnia*, Gould.—Tenasserim valley. Rare.

39. *H. anceps*, Gould.—Tenasserim valley. Common.

40. *H. retrorsa*, Gould.—Tenasserim valley. Common.

41.\* *H. acerra*, B.—Mergui. Common.

42. *H. resplendens*, Philippi.—Tenasserim valley.

43. *H. Theodori*, Philippi.—Yanglaw. Very rare.

# CONCHOLOGY OF BIRMAH.

Tabular view of the distribution of *Helices* in Birma and the Tenasserim Provinces.

	Ava.	Thaet-mio.	Akowtong.	Rangoon.	Maulmein.	Mergui.	Therabuin Hill.	Phaiethan.	Tenasserim Valley.
* <i>Helix</i> Oldhami, B.	*	*	*	*	*	*	*	*	*
* „ sculpturata, B.	*	*	*	*	*	*	*	*	*
* „ bolus, B.	*	*	*	*	*	*	*	*	*
* „ pauxillula, B.	*	*	*	*	*	*	*	*	*
* „ mensula, B.	*	*	*	*	*	*	*	*	*
* „ haniola, B.	*	*	*	*	*	*	*	*	*
* „ petila, B.	*	*	*	*	*	*	*	*	*
* „ refuga, Gould.	*	*	*	*	*	*	*	*	*
* „ pausa, B.	*	*	*	*	*	*	*	*	*
* „ rotatoria, V. de Busch.	*	*	*	*	*	*	*	*	*
* „ tetrina, B.	*	*	*	*	*	*	*	*	*
* „ molecula, B.	*	*	*	*	*	*	*	*	*
* „ achatina, Gray.	*	*	*	*	*	*	*	*	*
* „ bombax, B.	*	*	*	*	*	*	*	*	*
* „ capessens, B.	*	*	*	*	*	*	*	*	*
* „ infrendens, B.	*	*	*	*	*	*	*	*	*
* „ Pylaica, B.	*	*	*	*	*	*	*	*	*
* „ catinus.	*	*	*	*	*	*	*	*	*
* „ cassidula, B.	*	*	*	*	*	*	*	*	*
* „ delibrata, B.	*	*	*	*	*	*	*	*	*
* „ Merguiensis, Philippi.	*	*	*	*	*	*	*	*	*
* „ Gabata, Gould.	*	*	*	*	*	*	*	*	*
* „ honesta, Gould.	*	*	*	*	*	*	*	*	*
* „ castra, B.	*	*	*	*	*	*	*	*	*
* „ refuga var. dextrorsa	*	*	*	*	*	*	*	*	*
* „ Saturnia, Gould.	*	*	*	*	*	*	*	*	*
* „ retrorsa, Gould.	*	*	*	*	*	*	*	*	*
* „ acerra, B.	*	*	*	*	*	*	*	*	*
* „ resplendens, Philippi.	*	*	*	*	*	*	*	*	*
* „ anceps, Gould.	*	*	*	*	*	*	*	*	*
* „ arx, B.	*	*	*	*	*	*	*	*	*
* „ convallata.	*	*	*	*	*	*	*	*	*
* „ biforcata, B.	*	*	*	*	*	*	*	*	*
* „ ategia, B.	*	*	*	*	*	*	*	*	*
* „ ceryx, B.	*	*	*	*	*	*	*	*	*
* „ artificiosa, B.	*	*	*	*	*	*	*	*	*
* „ causia, B.	*	*	*	*	*	*	*	*	*
* „ forabilis, B.	*	*	*	*	*	*	*	*	*
* „ perpaula, B.	*	*	*	*	*	*	*	*	*
* „ levicula, B.	*	*	*	*	*	*	*	*	*
* „ petasus, B.	*	*	*	*	*	*	*	*	*
* „ precaria, B.	*	*	*	*	*	*	*	*	*
* „ Theodori, Philippi.	*	*	*	*	*	*	*	*	*

## *Hypselostoma. Benson.*

44.\* *H. tubiferum*, B.—Thaet-mio. This singular little anostomatous shell was only met with at one spot on limestone rocks near the Coal mines, where it did not seem very rare.

## *Streptaxis Gray*

45. *S. Petiti*, Gould.—Maulmein. Tenasserim valley. Common.

## *Vitrina Draparnaud.*

49. *V. Birmanica Philippi*, was not met with by me.

## *Crytosoma Mihi, n. g.*

Testa vitrinae simile, sed robustiore. Peristomate obtuso haud tenue. Animale penitus intra testam retractile, et in aestivationis tempore, solido epiphragmate oblecto.

47. *C. praestans*, (*Vitrina praestans*) Gould.—Maulmein, Martaban, Tenasserim valley.—I have separated this shell from *Vitrina*, as the animal is perfectly retractile, and the peristome





## CONCHOLOGY OF MADRAS.

### FAMILY III. BUCCINIDÆ.

Fusus.  
Buccinum tranquebaricum.  
Bullia.  
Bullia vittata.  
Terebra maculata.  
Eburna spirata.  
Eburna zeylanica.  
Nassa.  
Nassa crenulata.  
Nassa canaliculata.  
Nassa Jacksonianum.  
Nassa arcularia.  
Purpura rudolphi.  
Purpura; from *Chickuleoddy*. North of *Pulicat*.  
Oliva utriculus.  
Oliva utriculus, variety.  
Oliva ispidula.  
Oliva ispidula, variety.

### FAMILY IV. CONIDÆ: CONES.

Conus figulinus.

### FAMILY VI. CYPREIDÆ. COWRIES.

Cypræa moneta.

## SECTION B. HOLOSTOMATA, SEA-SNAILS.

### FAMILY I. NATICIDÆ.

Natica mamilla.  
Natica lineata.  
Sigaretus.

### FAMILY III. CERITHIADÆ: CERITES.

Cerithium microptera.

### FAMILY V. TURRITELLIDÆ.

Turritella.

### FAMILY VI. LITTORINIDÆ.

Littorina.  
Littorina lævis.

### FAMILY VII. PALUDINIDÆ.

Paludina.  
Bithinia.

Ampullaria.

### FAMILY IX. TURBINIDÆ.

Rotella vestiaria.

### FAMILY X. HALIOTIDÆ.

Ianthina fragilis.

### FAMILY XIII. PATELLIDÆ. LIMPETS.

Patella.

## ORDER II. PULMONIFERA.

### SECTION A. IN-OPERCULATA.

### FAMILY I. HELICIDÆ. LAND-SNAILS.

Helix Maderaspata.  
Helix.

### FAMILY IV. LIMNÆIDÆ.

Lymnea.  
Planorbis Indicus.

## CLASS V. CONCHIFERA.

### SECTION A. ASIPHONIDA, Without Respiratory Siphons.

### FAMILY I. OSTREIDÆ.

Pecten.

### FAMILY II. AVICULIDÆ.

Meleagrina.  
Pinna.

## CONCHOLOGY OF ASIA.

### FAMILY III. MYTILIDÆ: MUSSELS.

Mytilus.  
Modiola.

### FAMILY IV. ARCADÆ.

Arca.  
Arca tortuosa.

### FAMILY X. CARDIADÆ.

Cardium Dupurchase?  
Cardium. *Species*.  
Cardita imbricata.

### FAMILY XIV. VENERIDÆ.

Venus.  
Meroe picta.

### FAMILY XV. MACTRIDÆ.

Maetra.

### FAMILY XVI. TELLINIDÆ. THE TELLENS.

Tellina virgata.  
Donax scortum.  
Donax scortum, variety.  
Donax cuneatus.

### FAMILY XVII. SOLENIDÆ.

Sub-Genus Maehara, Cultellus politus.

CONCHOLOGY OF ASIA. *Shells from Asia generally, in the Government Central Museum, Madras.*

## CLASS I. CEPHALOPODA CEPHALOPODS.

### ORDER I. DIBRANCHIATA.

#### SECTION A. OCTOPODA.

### FAMILY V. SEPIADÆ.

Sepia or Cuttle fish; internal shell of a species of,

### FAMILY VI. SPIRULIDÆ.

Spirula Peronii. *Indian Seas*.

### ORDER II. TETRABRANCHIATA.

### FAMILY I. NAUTILIDÆ

Nautilus pompilius. *Indian Archipelago*.

## CLASS II. GASTEROPODA. GASTEROPODS.

### ORDER I. PROSOBRANCHITA.

#### SECTION A. SIPHONOSTOMATA.

### FAMILY I. STROMBIDÆ.

Strombus urceus. *Singapore*.  
Strombus urceus, variety, *Indian Seas*.  
*pelaga*.  
Strombus melanostoma. *Indian Archi*  
Strombus auris Dianæ. Sowerby. *S*.  
Guttata Reeve. *Indian Archipelago*.  
Strombus floridus. Reeve. *S. Mutabilis*.  
Sowerby. *Seychelle Islands*.  
Strombus Tricornis. *Red Sea*.  
Strombus, young of, probably *S. Tricornis*,  
Sowerby. *Red Sea*.  
Strombus succinctus. *Indian Seas*.  
Strombus marginatus. *Indian Seas*.  
Strombus dentatus. Reeve. *Indian Seas*.  
Strombus Mauritianus. *Ceylon*.  
Strombus cylindricus. *Indian Seas*.  
Strombus lentiginosus. *Indian Seas*.

## CONCHOLOGY OF ASIA.

*Strombus canarium*. *Ceylon*.  
*Strombus canarium*, variety. *Labuan*.  
*Strombus Isabella*. *Singapore*.  
*Pteroceras*. *Ceylon*.  
*Pteroceras chiragra*. *Ceylon*.  
*Pteroceras chiragra*, variety.  
*Pteroceras scorpio*. *Indian Seas*.  
*Pteroceras aurantia*. *Ceylon*.  
*Pteroceras lambis*. *Indian Seas*.  
*Rostellaria cancellata*. Kiener.—N. B.  
 • Generic and specific name of this shell much disputed. *Ceylon*.  
*Rostellaria rectirostris*. *Labuan*.  
*Seraphs*, Woodward. (*Terebellum*) *sabulatum*, Lamarck. *Ceylon*. &c.

### FAMILY II. MURICIDÆ.

*Murex haustellum*. *Ceylon*.  
*Murex tenuispina* *Trincomallee*, *Ceylon*.  
*Murex nigripina*, *Singapore*.  
*Murex anguliferus*. *Ceylon*.  
*Murex pinnatus*. *China*.  
*Ranella*. *Aden*.  
*Triton clandestinus*. *Ceylon*.  
*Pyrula vesperilio*. Lamarck. *Pugilinus*.  
*Born*.  
*Pyrula ficus*. *Ceylon*.  
*Pyrula ficus*. *Madras*.  
*Fusus*. *Species From Red Sea*.  
*Fusus*. *Species From Red Sea*.

### FAMILY III. BUCCINIDÆ.

*Bullia vittata*; from *Trincomallee*,  
*Anolax* or *Bullia*, *Madras*:  
*Eburna spirata*, *Madras*.  
*Nassa*. *Species Labuan*.  
*Nassa clathrata*. *Labuan*.  
*Nassa*. *Species Labuan*.  
*Purpura persica*. *Moulmein*.  
*Planaxis sulcatus*, from *Ceylon*.  
*Cassis decussatus*. *Singapore*.  
*Columbella pardalina*. *Labuan*.  
*Columbella*. *Species Labuan*.  
*Columbella terpsichore*. *Ceylon*.  
*Oliva utriculus*. *Ceylon*.  
*Oliva utriculus*, variety. *Labuan*.  
*Oliva maura*. *Labuan*.

### FAMILY IV. CONIDÆ : CONES.

*Pleurotoma*, from *Red Sea*.

### FAMILY V. VOLUTIDÆ.

*Mitra corrugata*. *Labuan*.  
*Mitra melongena*. *Singapore*.  
*Mitra Gruneri*, *Labuan*.  
*Mitra vulpecula*, variety. *Labuan*.  
*Mitra*, undescribed. *Singapore*.  
*Mitra amphorella*. *Labuan*.

### FAMILY VI. CYPRÆIDÆ. COWRIES.

*Ovulum ovum*. *Ceylon*.

## SECTION B. HOLOSTOMATA. SEA-SNAILS.

### FAMILY I. NAUTICIDÆ.

*Natica Chinensis*.  
*Natica lineata*. *Madras*.

## CONCHOLOGY OF ASIA.

### FAMILY III. CERITHIADÆ : CERITES

*Cerithium nodulosum*, from *Red Sea*.  
*Cerithium obeliscus*. *Singapore*.  
*Cerithium obeliscus*, variety. *Labuan*.  
*Cerithium morus*. *Bay of Bengal*.  
*Cerithium ambiguum*. *Ceylon*.  
*Cerithidea obtusa*. *Singapore*.  
*Sub Genus Potamides*. *Cerithium microptera*.  
*Madras*.  
*Sub Genus Potamides*. *Cerithium palustre*.  
*Trincomallee*, *Ceylon*.

### FAMILY IV. MELANIADÆ.

*Melania*. *Species Ceylon*.  
*Melania*. *Species Irawadi*.  
*Melania tuberculata*. *Calcutta*.  
*Melania Gardnerii*. *Ceylon*.  
*Melania variabilis*. *Calcutta*.  
*Melania*. *Species Tenasserim*.  
*Melania lyrata*. *Calcutta*.  
*Melania spinulosa*. *Calcutta*.  
*Melania spinulosa*, variety. *Calcutta*.  
*Melania*. *Species Madras*.  
*Melania*. *Species Calcutta*.  
*Melania flammigera*. *Labuan*.  
*Melania*. *Ceylon*.  
*Paludomus loricatus*. *Calcutta*.  
*Paludomus*. *Sylhet*.  
*Paludomus conicus*. *Sylhet*.  
*Paludomus funiculatus*. *Calcutta*.  
*Paludomus*. *Species Calcutta*.  
*Paludomus*. *Species Calcutta*.  
*Paludomus*. *Species Island of Bombay*.  
*Paludomus*. *Species India*.  
*Paludomus*. *Species India*.  
*Pirena terebralis*, Lamarck. *Ceylon*. *Calcutta*.

### FAMILY V. TURRITELLIDÆ.

*Turritella*. *Species Sadras*.  
*Turritella terebra*. *Singapore*.

### FAMILY VI. LITTORINIDÆ.

*Littorina lœvis*. *Calcutta*.  
*Littorina palleata*. *Ceylon*.  
*Littorina zig-zag*. *Ceylon*.  
*Littorina malaccana*. *Ceylon*.  
*Littorina brochiformis*. *Ceylon*.  
*Littorina brochiformis*. *Ceylon*.  
*Assiminea sulcata*. Banks of *Hooghly*, towards  
*Sea*.

*Assiminea*. *Species Singapore*.  
*Nematura deltæ*. *Calcutta*.  
*Truncatella*, *Species from Malacca*.  
*Truncatella*, *Species from Calcutta*.  
*Truncatella*. *Species Ceylon*.  
*Truncatella*. *Species Ceylon*.  
*Truncatella*. *Species Ceylon*.

### FAMILY VII. PALUDINIDÆ.

*Paludina Bengalensis*. *Calcutta*. *Madras*.  
*Paludina Bengalensis*, variety. *Tenasserim*.  
*Paludina melanostoma*? *Calcutta*.  
*Paludina melanostoma*? *Madras*.  
*Paludina præmorsa*, variety, *Tenasserim*.  
*Paludina*. *Calcutta*.  
*Bithinia pulchella*. *Calcutta*.



## CONCHOLOGY OF ASIA.

*Bitinia. Island of Bombay.*

*Bitinia, from Sind.*

*Ampullaria. Malacca.*

*Ampullaria (glauca)? Ceylon.*

*Ampullaria. Island of Bombay.*

*Ampullaria globosa, from Sylhet.*

*Ampullaria. Island of Bombay.*

*Valvata marginalis. Ceylon.*

### FAMILY VIII. NERITIDA.

*Neritina brevispinosa. Palawan.*

*Neritina strigillata. Labuan.*

*Neritina auricularia. Calcutta.*

*Neritina retifera. Calcutta.*

*Neritina depressa. Calcutta.*

*Neritina depressa, variety. Singapore.*

*Neritina dubia, Lamarek. Ceylon.*

*Neritina pupa; Jamaica.*

*Neritina virginea. Ceylon.*

*Neritina. Madras.*

*Navicella tessellata. Calcutta.*

*Navicella tessellata. Calcutta.*

### FAMILY IX. TURBINIDÆ.

*Turbo, Species from Red Sea.*

*Trochus, Species young, from Red Sea.*

*Trochus punctulatus. New Zealand.*

*Trochus. Species Malacca.*

*Trochus. Species Aden.*

*Trochus, Species from Red Sea.*

*Trochus stellaris. Malacca.*

*Trochus maculatus Aden.*

*Trochus. Species Aden.*

### FAMILY X. HALIOTIDÆ.

*Haliotis. Ceylon.*

*Ianthina fragilis, Sowerby: Communis, of Lamarek.*

*Ianthina fragilis, with its Float.*

### FAMILY XII. CALYPTRÆIDÆ. BONNET-LIMPETS.

*Calyptrea sinensis.*

### FAMILY XIII. PATELLIDÆ. LIMPETS.

*Patella. Species Aden.*

*Sub Genus of Patella. Siphonaria. Ceylon.*

### ORDER II. PULMONIFERA.

#### SECTION A. IN-OPERCULATA.

### FAMILY I. HELICIDÆ. LAND-SNAILS.

*Helix melanotragus. Ceylon.*

*Helix melanotragus, variety. Ceylon.*

*Helix juliana. Ceylon.*

*Helix juliana, Gray. Ceylon.*

*Helix Valtoni, Lin. Ceylon.*

*Helix hæmastoma. Ceylon.*

*Helix hæmastoma, variety. Ceylon.*

*Helix hæmastoma, variety. Ceylon.*

*Helix nobilis. Malacca.*

*Helix nobilis. Singapore.*

*Helix densa, from the Island of Daat situated between Labuan and the coast of Borneo.*

*Helix Species Neilgherries.*

*Helix vittata, variety. Ceylon.*

*Helix maderaspatana; variety. Bangalore.*

*Helix nanoides. Singapore.*

## CONCHOLOGY OF ASIA.

*Helix interrupta, Botanical Garden. Calcutta.*

*Helix metaforma. Philippine Islands.*

*Helix fallaciosa, var: Ceylon.*

*Helix Species allied to Helix carabinata. Tenasserim valley.*

*Helix carabinata. Calcutta.*

*Helix iloconensis. Philippine Islands.*

*Helix sphaerica. Philippine Islands.*

*Helix regalis. Borneo.*

*Helix viridis? Philippines.*

*Helix bistrialis. Madras.*

*Helix bistrialis, variety. Ceylon.*

*Helix bistrialis, variety. Madras.*

*Helix. Ceylon.*

*Helix. Tenasserim.*

*Helix Bombanensis, from Poona, not to be found in Bombay.*

*Helix similis. Island of Bombay.*

*Helix. Species Aden.*

*Helix Caracolla. Mauritius.*

*Helix Species Aden.*

*Helix. Species Ceylon.*

*Helix. Species Neilgherries,*

*Helix Naikenary. Neilgherry.*

*Streptaxis. Species Calcutta?*

*Sub Genus (Stenopus.) Helix lævipes, variety. Bombay.*

*Sub Genus (Stenopus.) Helix lævipes, variety, from the Island of Elephantia, Bombay.*

*Sub Genus (Stenopus.) Helix lævipes, white variety.*

*Nanina, Species from the Island of Daat situated between Labuan and the coast of Borneo.*

*Nanina. Helix vitrinoides, Island of Bombay.*

*Nanina. Helix naninia, Jaffna.*

*Nanina. Helix. Ceylon.*

*Nanina. Helix (nanina.) Pegue.*

*Vitrina. Manantoddy.*

*Vitrina gigas. Sylhet.*

*Succinea. Calcutta.*

*Succinea crassinocula. Jaffna. Calcutta.*

*Succinea. Island of Bombay.*

*Succinea. Calcutta.*

*Bulimus Reevei, Philippine Islands.*

*Bulimus lignorius. Philippine Islands. Bulimus lignorius, variety.*

*Bulimus lignorius, variety? Philippine Islands.*

*Bulimus mus. Philippine Islands.*

*Bulimus Bairdii. New Calodonia.*

*Bulimus faunus. Philippine Islands.*

*Bulimus Bengalensis, variety. Bombay.*

*Bulimus Bengalensis, variety. Calcutta.*

*Bulimus Bengalensis, variety.*

*Bulimus citrinus. Singapore.*

*Bulimus citrinus, variety.*

*Bulimus, Koondapore on the road between Poonah and Jaulnah.*

*Bulimus calista. Philippine Islands.*

*Bulimus cœnopictus. Island of Bombay.*

*Bulimus. Species India.*

*Bulimus chrysalidiformis. Philippine Islands.*

## CONCHOLOGY OF ASIA.

*Bulimus chrysalidiformis*, variety. *Philippine Islands*.  
*Bulimus lyonetianus*, from *Mauritius*.  
*Bulimus pullus*, variety. *Sind*.  
*Bulimus ovoideus*. *Philippine Islands*.  
*Bulimus punctatus*. *Bombay*.  
*Bulimus*. *Island of Bombay*.  
*Bulimus indicus*. *Island of Bombay*.  
*Bulimus daphnis*. *Philippine Islands*.  
*Bulimus nimbosus*. *Philippine Islands*.  
*Bulimus dactylus*. *Philippine Islands*.  
*Achatina fulica*, Pfr. *Mauritiana*, *Lamarek*.  
*Ceylon*.  
*Achatina gemma*, Land shells. *Ceylon*.  
*Achatina*. *Island of Bombay*.  
*Achatina nitens*. *Ceylon*.  
*Pupa bicolor*, Land shells. *Jaffna and Ceylon*.  
*Pupa*. *Species New Species*, from *Ceylon*.  
*Pupa*, *Species Land shell*. *Ceylon*.  
*Pupa*, *Species Land shell*. *Ceylon*.  
*Pupa*, *Species Land shell*. *Ceylon*.  
*Pupa*. *Species Ceylon*.  
*Cylindrella brevis*, Pfr. *Ceylon*.  
*Cylindrella hydrana*. *Jamaica, Ceylon*.  
*Cylindrella*. *Ceylon*.  
*Cylindrella agnesiana*, Jam. Ad.? *Ceylon*.  
*Cylindrella elongata*. *Ceylon*.  
*Cylindrella carnea*, Jam. Ad.? *Ceylon*.  
*Cylindrella*. *Ceylon*.  
*Cylindrella seminuda*, Jam. Ad.? *Ceylon*.  
*Cylindrella*. *Ceylon*.  
*Cylindrella alba*, Jam. ad. *Ceylon*.  
*Clausilia loxostoma*. *Sylhet*.  
*Clausilia*. *Species Ceylon*.  
*Clausilia*. *Species Ceylon*.

### FAMILY IV. LIMNÆIDÆ.

*Limnea chlamys*. *Sylhet*.  
*Limnea chlamys*, variety? *Calcutta*.  
*Limnea chlamys*, variety? *Calcutta*.  
*Limnea*. *Species Island of Bombay*.  
*Limnea*. *Species Island of Bombay*.  
*Planorbis indicus*.  
*Planorbis indicus*, variety. *Ceylon*.  
*Planorbis*, Fresh water tank shell. *Ceylon*.

### FAMILY V. AURICULIDÆ.

*Auricula*. *Ceylon*, also, *Calcutta Sunderbans*.  
*Conovulus*. *Species Labuan*.  
*Conovulus or melampus*. *Ceylon*.  
*Conovulus or melampus pedipes*. *Ceylon*.  
*Scarabæus Borneense*.  
*Melampus pusillus*. *Ceylon*.

## SECTION B. OPERCULATA.

### FAMILY VI. CYCLOSTOMIDÆ.

*Cyclostoma aquilum*. *Burmah*.  
*Cyclostoma*. *Species Mataran*.  
*Cyclostoma*. *Species Chittagong*.  
*Cyclostoma semistriatum*? *Roonah*.  
*Cyclostoma tuba*. *Malacca*.  
*Cyclostoma stenomphalum*. *Bombay*.  
*Cyclostoma sericatum*. *Island of Daat*, near *Labuan*.

## CONCHOLOGY OF ASIA.

*Cyclostoma sericatum*, variety. *Island of Daat*, near *Labuan*.  
*Cyclostoma vitrea*. *Island of Pappan*, near *Labuan*.  
*Cyclostoma*. *Western India*.  
*Cyclostoma volvulus*? *Tenasserim*.  
*Cyclostoma semisulcatum*. *Malacca*.  
*Cyclostoma involvulus*. *Ceylon*.  
*Cyclostoma involvulus*, variety. *Ceylon*.  
*Cyclostoma Borneense*.  
*Cyclostoma*. *Species Pegu*.  
*Cyclostoma perdix*. *Singapore*.  
*Cyclostoma*. *Species Sylhet*.  
*Cyclostoma*. *Species Singapore*.  
*Cyclostoma*. *Species India*.  
*Cyclostoma*. var: *India*.  
*Cyclostoma*. *Species Prome*.  
*Cyclostoma cornu-venatorium*. *Ceylon*.  
*Cyclostoma cornu-venatorium*, variety. *Ceylon*.  
*Cyclostoma*. *Species India*.  
*Cyclostoma*. *Species Darjeeling*.  
*Cyclostoma*. *Species Tenasserim valley*.  
*Cyclostoma maritimum*. *Ceylon*.  
*Cyclostoma*. *Species Ceylon*.  
*Cyclostoma*. *Species Jaffna*.  
*Cyclostoma*. *Species Ceylon*.  
*Cyclostoma bi-rostre*. *Borneo*.  
*Cyclostoma pterocyclos*? *Taylorianum*. *Borneo*.  
*Pterocyclos rupestris*. *India and Ceylon*.

## CLASS V. CONCHIFERA.

### SECTION A. ASIPIIONIDA, Without Respiratory Siphons.

#### FAMILY I. OSTREIDÆ.

*Pecten*. *Species Chickulcoody*, north of *Pulicat*.  
*Pecten*. *Species Chickulcoody*, north of *Pulicat*.  
*Pecten singaporinus*.  
*Pecten histronicus*. *Ceylon*.  
*Spondylus*. *Madras*.

#### FAMILY II. AVICULIDÆ.

*Crenatula*. *Red Sea*.

#### FAMILY III. MYTILIDÆ : MUSSELS.

*Mytilus*. *Malacca*.  
*Modiola*. *Ceylon*.  
*Modiola*. *Malacca*.  
*Modiola*. *Madras*.  
*Lithodomus*. *Malacca*.  
*Lithodomus malayanus*.  
*Dreissena*. *Labuan*.

#### FAMILY IV. ARCADÆ.

*Area volucris*. *Malacca*.  
*Area fusca*. *Singapore*.  
*Area disparilis*. *Malacca*.  
*Area granosa*. *Malacca*.  
*Area antiquata*. *Malacca*.

#### FAMILY VI. UNIONIDÆ ; NAIDES.

*Unio marginalis*. *Ceylon*.  
*Unio cæruleus*. *Calcutta*.  
*Unio marginalis*. *Calcutta*.  
*Unio*. *Species Ceylon*.  
*Unio*. *Species Tenasserim*.  
*Unio*. *Species Tenasserim*.



## CONCHIOLOGY OF ASIA.

Unio. *Species* from *Wye* near *Mahabuleshwar*.

Unio. *Species* undescribed. *Malacca*.

Unio. *Species* *Tenasserim*.

Unio *favidens*. *Calcutta*.

Unio *Grayii*. *China*.

Unio. *Species* *Irawadi*.

### FAMILY IX. FRIDACNIDÆ.

Hippopus, from *Trincomallee* in *Ceylon*.

### FAMILY X. CARDIADÆ.

*Cardium angulatum*. *Ceylon*.

*Cardium*. *Ceylon*.

*Cardium setosum*, variety? *Madras*.

*Cardium multispinosum*. *China*.

*Cardium fimbriatum*. *Malacca*.

### FAMILY XII. CYCLADIDÆ.

*Cyrena malaccensis*. *Malacca*.

*Cyrena*. *Species* *Moulmein*.

*Cyrena*. *Species* *Gurseppa* Village on the *Honawer River*.

### FAMILY XIII. CYPRINIDÆ.

*Circe*. *Species* *Aden*.

*Circe scripta*, variety. *Singapore*.

*Cardita imbricata*. *Madras*.

### FAMILY XIV. VENERIDÆ.

*Venus dorsata*. *Malacca*.

*Venus*. *Species* *Labuan*.

*Cytherea aurantia*. *Mazatlan*.

*Cytherea impudica*. *Labuan*.

*Cytherea impudica*, variety.

*Cytherea crycina*. *Ceylon*.

*Cytherea rosea*. *Mazatlan*.

*Cytherea festina*. *China*.

*Meroe*. *Malacca*.

*Sub Genus* *Trigona*, *Cytherea undulata*. *Mazatlan*.

*Sub Genus* *Trigona*. *Species* *Malacca*.

*Artemis*. *Species* *Malacca*.

*Artemis*. *Species* *Pulicat*.

*Artemis*, undescribed. *Species* *Malacca*.

*Tapes ramosa*. *Malacca*.

*Glaucomya*. *Species* *Malacca*.

*Glaucomya*. *Species* *Malacca*.

*Glaucomya*. *Species* *Malacca*.

### FAMILY XV. MACTRIDÆ.

*Mactra violacea*. *Malacca*.

*Mactra*. *Species* *Ceylon*.

*Mactra*. *Species* *Ceylon*.

*Mactra*. *Species* *Singapore*.

*Mactra*. *Species* *Ceylon*.

*Mactra Reevesii*. *Malacca*.

*Mactra*, variety. *Madras*.

*Mactra*. *Madras*.

### FAMILY XVI. TELLINIDÆ. THE TELLENS

*Tellina*? *Species* *Pulicat*.

*Tellina virgata*. *East Indies*.

*Tellina rostrata*: *Tellina vulsella*. of *Mus*. *Brit. Singapore*.

*Tellina*. *Species* *Malacca*.

*Tellina*. *Species* *Singapore*.

*Sanguinolaria*. *Species* *Malacca*.

*Sanguinolaria*. *Species* *Aden*.

*Mesodesma*. *Species* *Malacca*.

## CONCHIOLOGY OF ASIA.

### FAMILY XVII. SOLENIDÆ.

*Solen*. *Species* *India*.

*Solen lacteus*. *Mus. Brit. Malacca*.

*Solen*. *Species* *Malacca*.

*Solen*, undescribed. *Species* *Malacca*.

*Solen*. *Species* *Malacca*.

*Novaculina Gangeticus*. *Calcutta*.

*Novaculina*. *Species* *Malacca*.

*Novaculina*. *Species* *Tenasserim*.

*Novaculina*. *Species* *Malacca*.

### FAMILY XXI. PHOLADIDÆ.

*Pholas*. *Madras*.

*Part III. Shells presented by W. Theobald, Esq.*

*Cyclophorus Haughteni*. *Theobald. Moulmein*.

*Cyclophorus Siamensis*. *Sowerby. Teria Ghat. (Khasia Hills)* 2 sp.

*Cyclophorus Pearsoni*. *Benson. Lacat. (Khasia Hills)* 2 sp.

*Cyclophorus fulguratus*. *Pfr. Thalet mio. Rangoon*.

*Cyclophorus expansus*. *Pfr. Tenasserim Valley*.

*Cyclophorus turobrulus*. *Mull. Midnapur*.

*Cyclophorus zebrinus*. *Benson. Naclai. (92° 30'E. 25° 15'N)*.

*Pterocyclos hispidus*. *Pearson. Teria Ghat. (3 sp)*.

*Helix orantes*. *Benson. Naclai*.

*Helix textilis*. *Benson. Henzadda*.

*Helix Laidiana*. *Benson. Tributary Mehals. (2 sp)*.

*Helix interrupta*. *Benson. Calcutta*.

*Helix sculpturita*. *B. Ava*.

*Helix Bolus*. *B. Thalet-mio (2 sp)*.

*Helix rotatoria*. *V. de Busch. Akontong on Irawaddi R. (2 sp)*.

*Helix artificiosa*. *Bens. Tenasserim, Valley*.

*Helix achatina*. *Gray. Moulmein. (3 sp)*.

*Helix tuparia*. *Benson. Teria Ghat*.

*Helix Merguiensis*. *Philipps. Moulmein*.

*Helix climacterica*. *Benson. Teria Ghat*.

*Helix plectostoma*. *Benson. Teria Ghat*.

*Helix serrula*. *Benson. Teria Ghat. (3sp)*.

*Helix similis*. *Fer. Dacca*.

*Helix honesta*. *Gould. Moulmein*.

*Cryptosoma* (*Theobald*) (*Vitrina*) *Præstans*. *Gould. Moulmein*.

*Leptopoma aspirans*. *Bens. Tenasserim Valley. (2 sp)*.

*Megalomastoma gravidum*. *Benson. Moulmein*.

*Bulimus perversus*. *Var: atriculosus. Gould. Tenasserim Valley*.

*Bulimus scindiars*. *Benson. Punjab*.

*Bulimus pallus*. *Gray. Punjab. Ava*.

*Bulimus punctatus*. *Auton. Mhow*.

*Bulimus cænopictus*. *Hutton. Jabulpur. (2 sp)*.

*Clausilia Philippiana*. *Pfr. Moulmein*.

*Clausilia loxostoma*. *Benson. Teria Ghat. (3 sp)*.

*Streptaxis Petiti*. *Gould. Moulmein. Tenasserim Valley*.

*Alycaeus prosectus*. *B. Teria Ghat. (vide March annals)*.

## COPPER ORES.

*Diplommata diplocheilus* B. *Teria Ghat*.  
*J. Natural* (Hist.) (3 sp).  
*Hydrocena frustrillum*. Benson. *Ava.* (3 sp).  
*Pupa bicolor*. Hutton. *Bengal.* (1 sp)  
*Paludina bengalensis*. *Benares*.  
*Bithinia cerameopoma*. B. *Benares*.  
*Neritina tigrina*. Benson. *Calcutta*.

## COPPER ORES.

*Neritina fuliginosa*. Theobald. *Ava.*  
*Neritina cryptospira*. B. *Salween River*.  
*Modiola emarginata*. B. *Calcutta*.  
*Corbicula arata*. Benson. *Tenasserim River*.  
*Scaphula pinna*. B. *Tenasserim River*.  
*Paludomus labiosa*. B. *Tavoy province*.  
*Paludomus stephanus* *Teria Ghat*.

## (632) CONDIMENTS GROWN IN TRAVANCORE.

### List of Condiments.

Botanical Names.	English Names.	Malayalim Synonyms.	Remarks.
<i>Areca catechu</i> , ... ..	Areca nut, ... ..	Caleepaecoo, ... ..	One of the staple products of Travancore: the nuts are cut into thin slices and prepared for exportation; the average annual amount exported is about 2,000 candies. A greater number is consumed in the country, as the tree is common in every district.
<i>Allium sativum</i> , ... ..	Garlic, ... ..	Vally poondoo, ...	
<i>Caryophyllus aromaticus</i> , ...	Cloves, ... ..	Keeramboo, ... ..	Clove trees. Succeed very well in General Cullen's garden, at an elevation about 1,800 feet. The products of these trees are excellent and may be reckoned among the finest specimens that may be seen any where.
<i>Coriandrum sativum</i> , ... ..	Coriander seed, ... ..	Kottamully, ... ..	
<i>Capsicum frutescens</i> , ... ..	Chillies, ... ..	Moolagoo vuttel, ...	
... ..	Bead Chillies, ... ..	Cantharee Molagoo	
<i>Coffea Arabica</i> , ... ..	Coffee, ... ..	Kappee, ... ..	Safflower. Of late years the exportation has fallen off. A great deal is consumed in the country.
<i>Carthamus tinctorius</i> , ... ..	Safflower, ... ..	Mungel, ... ..	
<i>Chavica Roxburghii</i> , ... ..	Long pepper <sup>Oh</sup> , ... ..	Thirpeeler, ... ..	
<i>Elettaria cardamomum</i> , ... ..	Cardamoms, ... ..	Yalum, ... ..	Plantations are in the North-East districts. The cardamoms are collected in November and December. They are only of the government monopoly, as the cultivators chiefly come from Madura and Dindigul and receive about two hundred Rs. for each candy delivered to the Circar. The average annual produce is 300 candies.
<i>Miristica moschata</i> , ... ..	Nutmeg, ... ..	Jathi-kaie, ... ..	
" ... ..	Mace, ... ..	Patheerce ... ..	Tapioca is extensively cultivated in gardens. Great care is requisite in the preparation of these roots, as they contain a poisonous principle, which is only got rid off by the application of strong heat. The poorer classes use the tapioca flour, but none is exported.
<i>Jatropha manihot</i> , ... ..	Tapioca, ... ..	Maracheence, ... ..	
<i>Laurus cinnamomum</i> , ... ..	Cinnamon, ... ..	Karoovay-putty, ...	Mustard. Cultivated in the Southern districts, but not to any great extent.
<i>Sinapis chinensis</i> , ... ..	Mustard, ... ..	Kadocoo, ... ..	
<i>Trigonella fœnum græcum</i> , ...	Fenugreek, ... ..	Venthayum, ... ..	It is largely cultivated and collected in the month of November and October: the average annual produce is about 2,000 candies.
<i>Zinziber officinalis</i> , ... ..	Dried ginger, ... ..	Sookoo, ... ..	

M. E. J. R.

(633) **COPPER ORES.** These of good quality occur in Guntoor, Nellore and Cuddapah; the samples however are small. Mineral samples of Copper are known to occur in 17 or 18 different localities of Southern India, in the forms of green carbonate and grey and liver colored ores, but the metal has never been traced to good veins or nests.

The green and liver colored oxides are said to occur in Kurnool, Cuddapah and Nellore. The specimens sent from the Copper Mountain Bellary as rich liver colored Copper ore, have been carefully tested and do not contain a trace of Copper. They are rich Iron ores (Hæmatitic).—  
M. E. J. R.

The mountainous parts of Nepaul are rich in mines of iron and copper. The produce of the former is smelted in other hills than those where the ore is found. The copper is of a very superior kind, and before the opening of a trade between England and India, was preferred for consumption in the territories of the King of Oude to that exported from Britain. Its supercession by the European produce, doubtless arose from the difficulty and expense of transportation through a mountainous tract, having no navigable rivers, and the ignorance of the Nepaulese in the arts of mineralogy and metallurgy. Lead mines, yielding also a proportion of silver, are to be found in Moukote and it is supposed that



## CRATŒVA TAPIA.

there are gold mines to the North, though as yet no traces of gold have been discovered excepting in the beds of the torrent which rush through Kachar to the eastward.—*Smith's Nepaul*.

(634) CORIANDRUM SATIVUM. Lin.

*The Greens.*

Cottamillie keeray, TAM. Coriander Greens, ENG.

—*Ainslie*, p. 253.

(635) CORONILLA GRANDIFLORA.

Buka, SANS.

Buka, also Augasta, BEN.

Basna, HIND. the red-

flowered variety, and

Sada Basna The white,

HIND.

Yerra avesi, TEL.

The name of the red flowered variety.

Tella avesi, TEL. The

white flowered.

A small, delicate tree from twenty to thirty feet high of only a few year's duration. It is generally found in the vicinity of villages, where the natives encourage its growth, for the sake of the leaves and tender pods which they use in their curries. It is in flower and fruit most part of the year.

The tender leaves and young legumes are much used in food, by all classes of the natives.

The tree is employed for training the *Betel* plant (*Piper Betel*) it admits the sun's beams, and the wind better than any other of its height, being thin of branches and leaves, particularly after it is more than one year old. It is of a very quick growth, which is another reason for employing it. The wood is only fit for fuel. Cattle eat the leaves and tender parts.—*Roxburgh's Flora Indica*, p. 331-2.

Natives commonly plant this about their houses at Bombay. It has large showy flowers and is of very quick growth.—*Graham (Thomson's Records of General Science)*, Vol. IV. p. 115.

(636) CORONILLA PICTA, is the Krishna rajam of Bengal, a plant highly esteemed for the beauty of its purple flowers, and the emollient qualities of its leaves. These are applied as a cataplasin to suppurating tumors.—*O'Shaughnessy*, pages 316-17.

(637) CORYPHA GEBANGA; GEBANG PALM. The *Corypha gebanga*, Blume, is a useful tree, in Java, thousands of boys and girls are employed in fabricating its leaves into baskets and bags: thatch, and broad brimmed hats are made of them; and fishing nets are woven from their fibre and ropes manufactured from their stalks.—*Seeman*

(638) CRATŒVA TAPIA. Lin. POLYANDRIA MONOGYNIA.

Smooth Cratœva tree. | Garlic Pear, ENG.

Mavilunghum, TAM. | Burua, HIND.

This is a common tree on the horublende schist rocks of Ajmeer. In May the tree is in profuse blossom and presents a splendid appearance, the flowers being blue and buff. The foliage is very ornamental, and the wood is used to make necklaces of. This hardy tree would be a great desideration in compounds.—*Genl. Med. Top.* p. 182. It grows to a very large size,

## CUCUMIS UTILISSIMUS.

and is used by the Natives for many common purposes.—*Ainslie's Mat. Med.* p. 211. Dr. Honigberger, tells us that the Cratœva Tapia grows in the gardens at Lahore, and that the fruit is said to be beneficial in that strange malady called serpent love.—p. 263 Vol. 1. p. 140.

(639) CRESSES, GARDEN. SISYMBRIUM NASTURTIUM, Lin.

Haleem, DUK. and HIND. | Tureh teyzuc, PERS.

Reshad, ARAB.

Cresson, FR.

In India, these are sometimes cultivated by Europeans and occasionally by Mahomedans. Water cresses are called in Dukhanie, Loot putiah.—*Ainslie's Mat. Med.* p. 12.

Among the dried seeds sold in Tenasserim bazars, for medicinal purposes, are the seeds of the common garden cress, *Lepidum sativum*.—*Mason*.

(640) CRINUM TOXICARIUM.

Bura-kanoor, HIND.

This is cultivated in gardens in Ajmere, and is very ornamental.—*Genl. Med. Top.* p. 188.

(641) CROTALARIA JUNCIA.

Sana also Senma, SANS.

Sun, BENG.

Chanamoo, TEL.

Henna, or Hane, CING.

Katou tandale cotte, REED.

*Mal. IX. t. 26.*

(642) CROTON VARIEGATUM. This has obtained the name of laurel, and is very commonly grown in pots at Bombay. The temporary bungalows on the Esplanade are surrounded with it to keep out the glare of the sun.—*Graham. (Thomson's Records of General Science)*, Vol. IV. p. 114

(643) CRYPTOMERIA JAPONICA succeeds admirably in China.—*Fortune's Tea districts*, page 16.

(644) CUCUMIS SATIVUS. Lin.

*The Oil.*

Kunkureike beenge ka

tail, DUK.

Vulleriverci ummay, TAM.

Oil of Cucumber seed.

This oil is used in cookery and for burning in lamps.—*Ainslie's Mat. Med.* p. 269.

(645) CUCUMIS UTILISSIMUS.

Dosray, TEL.

Gurke Ell lange, GER.

Kiza ul taail, ARAB.

Khyari badreng, PERS.

Kakree, HIND. and KASH-

MIR.

This is the Cucumber most used, as a vegetable, at Lahore, where it is met with half a yard in length, and is commonly eaten raw by the natives. The powder of the roasted seeds is described as a powerful diuretic, and serviceable in promoting the passage of sand or gravel.—(B. Disp.) *Honigberger*, Vol. 2 p. 265.

This is an annual, a native of the higher cultivated lands, but generally found in a cultivated state; the cold season is the most favorable.

This appears to me to be by far the most useful species of Cucumis that I know; when little more than half grown, they are oblong and a little downy, in this state they are pickled: when ripe they are about as large as an ostrich's egg, smooth and yellow, when cut they have much

## CURRENCY.

the flavour of the melon and will keep good for several months, if carefully gathered without being bruised and hung up; they are also in this stage eaten raw and much used in curries, by the natives.

The seeds like those of the other *Cucurbitace-ous* fruits contain much farinaceous matter blended with a large portion of mild oil; the natives dry and grind them into a meal, which they employ as an article of diet; they also express a mild oil from them, which they use in food and to burn in their lamps. Experience as well as analogy prove these seeds to be highly nourishing and well deserving of a more extensive culture than is bestowed on them at present.

The powder of the toasted seeds mixed with sugar is said to be a powerful diuretic, and serviceable in promoting the passage of sand or gravel. In Roxburgh's time, this agriculture was chiefly confined to the Guntoor Circar, where these seeds formed a considerable branch of commerce.

The fruit keeps well for several months if carefully gathered and suspended. This circumstance will render them a very excellent article to carry during long voyages.—*Roxburgh's Flora Indica*, Vol III. p.p. 721-22.

(646) CUCURBITACEÆ, the Cucumber and Melon tribe of plants, much employed as vegetable food, are said by Dr. Hunter, to abound in fibres of great length. Amongst these may be named;

(647) CIRCUBITA MAXIMA, "Squash-Gourd" Poosheenay kaya; Keeray: C. Citrullus, Petchay kaya, Watermelon, C. Onifera, Shoemay Poosheenay kaya, vegetable marrow, Cucumis usitata, Vellaree kai, Cucumber.

(648) CUMINUM CYMINUM, Var.  
Nutsiragum, TAM. | Coomunie siah, ARAB.  
Shazira, DUK. | Sajira seed. ENG.

Cumin seeds *Cuminum cyminum*, are a common article in the Pegu markets, and the plant, in Tenasserim is occasionally cultivated.—*Mason*.

(649) CURMBOLE, is the Malayala name of a wood from the forests in Canara. It grows to about twelve or eighteen inches in diameter, and from fifteen to thirty feet high; it is used by the natives for house-work, and is considered a useful and durable wood.—*Eclje, M. and C.*

(650) CURRENCY. The Currency of India is in the form of rupees, annas, and pice. The rupee is a silver coin, weighing three drams or a tola of 180 grains, and its rate of exchange varies about 2 shillings. It is current all over British India, on the coast line of the Southern Shores of Persia, Turkish Arabia, Arabia and Egypt, Arracan, Pegu, and Tenasserim, and Southwards towards the Mauritius.

The dollar is current from Singapore, through the Archipelago of Asia, in Borneo, Celebes, China, Cochin China, Java, Malay Peninsula, Moluccas, Sumatra, &c.

## CYORNIS BANYUMAS.

(651) CUTLERY. The rude and simple implements and tools, which ordinarily supply the wants of the natives of India, the little requirement for cutting instruments as articles for domestic use, and the cheap and abundant imports of the several articles included in this class, all tend most materially to depress the local manufacture; yet Salem and Trichinopoly afford abundant evidence of the skill with which this description of manufacture can be carried on. At the Madras Exhibition of 1855, the knives exhibited (or more strictly Daggers) from the Northern Division were excellent both as to the great excellence displayed in the workmanship, and as to the beauty and delicacy of the damasked surfaces between the highly polished and keen edges of the blade. They exhibited in a high degree the proficiency of the operatives in that part of the Madras Presidency.

Of the articles of cutlery exhibited by Arnachellum Achary, a well known Cutler at Salem, as regards manufacture, these articles may probably compete with those of Europe, though the prices are considered comparatively high, and the spear heads by the same maker were neatly executed and finished far superior to articles of this description ordinarily obtainable in this country.

The articles sent to the Exhibition from Austin, a cutler of Trichinopoly, although exhibiting considerable skill in manufacture, were inferior in workmanship to those from Salem. They are however much more moderately priced. The silver ornamental handled knives especially, are considered cheap and very good specimens of an art peculiarly Indian.—*M.E.J.R.*

(652) CUTTLE FISH BONE.  
Kadalnoora, TAM. | Sorupenka, TEL.

(653) CYCAS CIRCINALIS.  
Kabong, MALAY.

(654) CYCAS. There is a very ornamental species of cycas in the Karen forests resembling a low palm, but which has never yet been introduced around European seats.—*Mason*.

(655) CYNOMETRA.—(*The Mein-ga*, Bur.) is a small tree and makes good small posts, &c., but is chiefly used for fuel. It is abundant in the lower provinces, but grows in the upper when planted, which is sometimes done for fuel.—*Malcolm's Travels in South Eastern Asia*. V. 1. p. 191.

(656) CYORNIS BANYUMAS. In the beginning of April 1856 an author procured a fresh specimen (from the vicinity of Calcutta) of Cyornis banyumas, (Horsfield) a well known Javanese bird, only once known to have been procured before in India—viz. by Mr. Jerdon in the Nilgeris, his specimen being also now in the Bengal Society's collection. The Calcutta specimen is a young male, that had just assumed the plumage of maturity but still retaining some of the first or nestling wing coverts.—*Cal. Rev.*



## DALBERGIA.

(657) DADUGA TREE. NAUCLEA CORDIFOLIA.—*Roxb.*

Daduga, TEL.

Daduga is the Telugoo name of a large tree common in the mountainous parts of the Coromandel coast. The wood is extremely beautiful resembling that of the Box tree but lighter.—*Ainslie's Mat. Med.* p. 213.

(658) DAE JUNNAEE.

Dae junnaee, HIND.

An Accouchense.

(659) DÆMIA EXTENSA. OOTRUM FIBRE. is a promising substitute for fax. The plant grows in the Madras Presidency.

(660) DAH. The Tartar dah is made use of, not only as a sword in war, but also in peace for felling trees or cutting up firewood; consequently the friction on the handle is very great. Notwithstanding, the gum which fastens it adheres for years, except on the edge or end of the handle, where the wood itself becomes less or more worn.—*Bonyuge, America*, page 158.

(661) DALBERGIA HIRSUTA: COROMANDEL OR CALAMANDER WOOD. This is a Ceylon tree of great size, the wood having a dingy ground, and sometimes running into white streaks. It is used in cabinet work, like zebra and rose wood, to which it has some resemblance.—*Faulkner*. Tredgold mentions that the figure is between that of rose-wood and zebra-wood; the colour of the ground is usually of a red hazel brown, described also as chocolate brown, with black stripes and marks. It is said to be so hard as almost to require grinding rather than cutting, this is not exactly true, as the veneer saws cut it without particular difficulty: it is a very handsome furniture wood and turns well; it is considered to be a variety of ebony. Mr. Laird says there are three varieties of Coromandel; the Calamander or Coromandel, which is the darkest, and that most commonly seen in England, the Calamberri, which is lighter coloured and striped, and the Omander, the ground of which is as light as English yew, but of a redder cast, with a few slight veins and marks of darker tints. He says, the wood is scarce and almost or quite limited to Ceylon; that it grows between the clefts of rocks, this renders it difficult to extract the roots, which are the most beautiful parts of the trees. The Calamander wood tree is *Diospyros hirsuta*, and Kadum Berry is *C. Ebenaster*, according to Moore's Catalogue of Ceylon Plants, and therefore of the same genus as the true Ebony.—*Holtzapffel*.

(662) DALBERGIA? *Species*; LANCEWOOD OF MAULMAIN. There is a tree found all over

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the Provinces which yields a wood that the residents at Maulmain sometimes call lance-wood. The Karens make bows of it, but prefer *Cassia fistula*. Mason never met with the tree in flower, but thinks it a species of Dalbergia, though it may possibly be a Cassia.

(663) DALBERGIA LATIFOLIA? This furnishes one of the Black woods of Tenasserim. Under the Burman name of yendaik, the wood of two different trees is sometimes seen; one a species of ebony, and the other a leguminous tree which, according to the descriptions of the Karens, is a species of Dalbergia, and the wood resembles the black wood of Hindustan.—*Mason*.

(664) DALBERGIA SISSOO. Sissoo is one of the most valuable of the timber-trees of India, and with the saul, is more extensively employed than any other in north-west India. The ship-builders in Bengal select it for their crooked timbers and knees; it is remarkably strong, its colour is a light greyish brown, with darker coloured veins. "In structure it somewhat resembles the finer species of teak, but it is tougher and more elastic." There are two kinds used respectively in Bengal and Bombay, the latter is much darker in colour. The Indian black rose-wood, (*Dalbergia latifolia*), is a superior species of sissoo from the Malabar coast.

(665) DAMMER. Country Rosin or Dammer.

Coongilim, TAM.

Googilum, TEL.

Raul, DUK. and HIND.

Dammer batoo, MALAY.

Chloroxylon Dupada, Buch. Ainslie says, that of the substance usually termed Dammer by the English in India, there are three sorts to be met with in the bazars called, in Tamool, vullay Coongillium, carpoo Coongillium, and noray Coongillium; in other words white, black, and coarse Dammer. It much resembles the rosin obtained from the pine both in appearance and natural qualities and would seem to be common in many Asiatic countries, being found in great abundance in Sumatra, and in Java, on several of the Sooloo islands and in the Malayan peninsula. There are no doubt different kinds of it, some of which may be the produce of a species of pinus. But what is usually exposed for sale in the lower provinces of Hindoostan, is got amongst the mountains which separate Travancore from the Madras district. Dr. Buchanan first bestowed upon the tree the scientific appellation of *Chloroxylon dupada*, an account of which may be seen in his Journey through Mysore, Canara and Malabar. It is not known whether this tree bears any resemblance to that which produces Dammer on Amboyna. The reader may find a minute description of the last mentioned by

## DAMMER.

referring to Rumphius Tom. 2nd, Lib. 3rd, cap. 9th. I shall only further observe that the Tamool name of the Indian Dammer tree is chaducula. The Malayalam appellation is payana. The black and white both grow in the district of Coimbatore at a short distance from the town i. e. about 15 miles at a place called Motaman-spettaimulay.—*Ainslie*.

*Dammer* in India supplies the place of pitch and rosin, and in the Tenasserim Provinces is the product of three different genera, belonging to the wood oil tree family—the *shorea*, the *hopea*, and the *dipterocarpus*.—*Mason*.

*Dammer*, Pwai-ngyet, *Burm.*, is found in the bazars throughout Pegu. It is yielded by the *Shorea robusta* or the Saul-tree of India, which occurs plentifully in the Forests on the Shan side of the Sitang, east of Toungho, and also, but to less extent, in the forests of the Prome district. An observer had not found however that the dammer is obtained from these forests, as none of the trees appear to have been perforated for it, so that the supplies of this article are probably brought down to Pegu from forests beyond the frontier.—*McClelland*.

*Dummar* of Bengal is the Resin of *Shorea robusta*—*Ben. Phar.* 204.

*Dammar*, *White*, occurs in fragments of variable size, marked with reddish streaks, transparent, amber-like, brittle, with brilliant fracture, very inflammable, inodorous, and tasteless. This resin flows from the *Pinus dammara*, which grows on the lofty mountains of Amboyna. It hangs from the branches, and resembles stalactites, the pieces being sometimes as large as the hand, and 4 to 8 inches long; some pieces are like *animi* resin. The dammar of the Bengal bazars is usually the produce of the *Shorea robusta*.—*O'Shaughnessy*, p. 617.

### *Dammers of the Northern and Eastern Districts.*

Saul tree dammer. (*Shorea robusta* and other species). The *Vatica tumbagaia* grows also to a limited extent on the West coast, but yields little if any of the dammer collected there.

Occurs in sticks much resembling in shape the black dammer but differing widely in colour and consistency.

In color it varies from a light yellow to a dark brown. The two colours being very frequently found in the same lump and giving it the appearance of having a regular "grain" visible and differs from the white Dammer of the western coast in its inferior hardness, opacity and its peculiar form, and from the black dammer in its color.

An intelligent native correspondent writing from Gopalpore says, There are extensive tracts of Googulam (*Vatica*) jungles in Goomsur and Cuttack provinces. The Khoonds and Woodias living in and near these jungles, wound trees in several places. The resin is used and is collected

## DARJELING IN SIKKIM.

when sufficiently solid. The Dammer collected from the decayed parts of the tree is of a dark color: the tree is called Guggilam in Telugu and tala gotso in Urya. The Khoonds and Myras make the leaves into the plates from which they eat their food and also roll up tobacco in them to smoke like a cheroot. In time of famine the above tribes live on broth made from the fruit of this tree.

(666) DAMASONIUM INDICUM. See MACASSAR.

(667) DAPHNE CANNABINA, Lourc. Wall. in As. Res. xiii p. 385 c tab: Sikkim, Nepal, Kemaon &c. 5,000 to 9,000 feet elevation. It is from this shrub that the Nepal paper is derived. The bark is boiled in a metallic pot, with oak ashes, which are highly alkaline. The softened bark is then pounded with a mallet in a stone mortar, till reduced to a pulp like dough. This pulp is churned with water into a very thin paste, until it loses all trace of fibre, and will diffuse and settle smoothly. In this state it is poured into a coarse sieve placed over a frame, with a cloth bottom floating on water. The sieve stops the coarse pieces, allows the fine emulsion to pass through, and then by agitation this is smoothly deposited over the cloth. Removing the frame, the water filters away and the pulp dries rapidly by placing the frame before a fire.

The paper is subsequently polished by friction, with a shell or piece of hard wood, sheets have been made many yards square: it may be purchased at Katmandhu for 17 annas sicca for 3 seers. Bricks of the pulp are sold from 8 to 10 annas for 3 seers. The greater part of the paper is made by cis-Himalayan Bhotecahs, east of the Kali river. The manufacture seems to have been introduced from China, about 500 years ago.—*O'Shaughnessy*, p. 531.

(668) DARJELING IN SIKKIM. Sikkim, in which Darjeling is situated, from no mountains intervening directly between it and the sea, is fully exposed to the moist south winds bringing up vapour from the bay of Bengal. These, striking against the outer portion of the Sikkim range, deposit their moisture as rain, and suspend it as mists, clouding the sun for nearly the entire year. As Dr. Hooker says, "Sikkim is hence the dampest region of the whole Himalaya."

These moist winds, which give the damp character to the climate, also contribute chiefly to render the temperature equable. During the day, the moisture laden atmosphere precludes the entrance of the sun's rays to the deep and wet valleys, and the same cause acting by night, prevents terrestrial radiation going on to any extent. Nor is this dampness of the climate confined to the rainy season alone; in the rest of the year, the heavy moist air of Bengal is attracted by the rarified atmosphere of the



mountains of Sikkim, and still blows as a moist southerly wind; while the other parts of India are under the influence of the dry north-west monsoon of the winter season.

Darjeeling, at the height of 7,430 feet above the sea, has a mean annual temperature of 50° Fah. and a remarkably equable climate, the difference between the hottest and coldest months being 22°. Allowing one degree of mean temperature for every degree of latitude north of Calcutta, whose mean annual temperature, according to the latest accounts is 78° (Humboldt gives 82°), and one degree for every 300 feet of ascent, up to a certain altitude, we have the following scale of mean annual temperature for the various heights. Of course they are theoretical, and must vary according to the northern or southern exposure, and the clearing of ground from forest, &c. still they approximate nearly the truth.

Feet.	Mean Annual Temp. Fah.	Feet.	Mean Annual Temp. Fah.
600	72°	3600	62°
1200	70°	4200	60°
1800	68°	4800	58°
2400	66°	5400	56°
3000	64°	6000	54°

The mean temperature of the Cinchona forests is from 59° to 65°; according to this table then the region of the Sikkim Himalaya, where a climate much resembling this is found, will be between 2,400 and 4,800 feet, but 500 feet or more may be allowed both above and below those limits. The botany of these portions of the Himalaya, near Darjeeling, is peculiarly interesting. In the plains below, the usual features of a tropical vegetation are observed, especially in the Terais or bands of jungle which skirts the base of the mountains, where however forms from the high land begin to appear. About 2,000 feet of elevation forests of gigantic trees of Magnolia, Cedrela, subtropical Oaks, mingled with Acanthaceæ, Melastomaceæ, &c., occur here. Dr. Hooker says, "the gullies are choked with vegetation, and bridged by fallen trees, whose trunks are richly clothed with Dendrobium Pierardi, and other Epiphytical Orchids, with pendulous Lycopodia, and many Ferns, Hoya, Scitamineæ, and similar types of the hottest and dampest climates." Convolvuli and Vixies are very common, and those rope-like plants, which form a remarkable feature in the forests of the Andes, are here observed in great abundance, throwing their cable-like stems from branch to branch; they belong chiefly to the genera Bauhinia and Robinia, among the Leguminosæ. The adversity of this aspect of the Flora is increased by scandent trumpet flowered Bignonia-

ceæ, and slender Araliaceæ (Ivies) and Dioscoreas nearly allied to the Smilaceneæ, Peppers, Wild Plantains and many species of Bamboo are common, the latter a useful article to the ingenious Lepchas. There is no climbing Bamboo among them analogous to the Chisnea scandens, the climbing Bamboo of Humboldt and Roupelaud, its place is however supplied by climbing Palms of the Genera Calamus and Plectocomia, which are found in this Zone of the Sikkim Flora, along with the Phoenix acaulis, a variety of Date Palm. The other Palms of the Sikkim mountains are Wallichia oblongifolia, Areca gracilis, Caryota urens, and Licuala pellata. Here too grows the tree fern, Alsophila gigantea, extending from 2,000 to in some cases 6,500 feet of elevation on the mountains near Darjeeling, and probably indicating here, as its congener in the Andes does, the upper limits to which the cultivation of Cinchona might be carried with success. To these may be added the Cinchona gratissima and C. Pinceana of Wallich, now made by some botanists a separate Genus, under the name of Luculia, true natives of these mountains, whose forests are enlivened by the gorgeous colors of their flowers. Above Darjeeling, Oaks and Chesnuts occur abundantly, with Rhododendrons, and the English Yew; pines, however, from the humidity of the atmosphere, are rare on the outer range, English fruits, grains and potatoes are cultivated near Darjeeling; and, in the valleys below, many varieties of rice, with Indian corn. The geological structure of the mountains of Sikkim is very uniform, the rocks being principally varieties of micaceous shale and gneiss. The soil is generally formed by the disintegration of these rocks, and is covered in some places with vegetable mould.—*Indi. Anna. Medi. Science*, page 264.

(669) DAVALLIA. Davallia is an elegant fern characterised by the fructifications being "in roundish separate spots, near the margin," and is very plentiful in the neighbourhood of Maulmain. —*Mason*.

(670) DAWUT OR EXORCISM, practised by the Mahomedans in India to command the presence of genii and demons,—for the protection from evil, casting out of devils, to create enmities, friendships or love between people, to destroy or injure enemies, detecting crimes. These are effected by philters, puleetals or lamp charms, smoke charms, amulets.—*Herkl*.

(671) DAY. Mahomedans in India reckon part of a day for the whole; thus what they mean by three days, is the day on which an event happens and the two following. The Mahomedans reckon the sidereal day, in their time, from sunset to sunset, differing thus from the European civil day, midnight to midnight, or solar day, midday to midday.

## DEYRA DOON.

(672) *DECASCHISTA CROTONIFOLIA*, appears to yield a good fibre.

(673) DEYRA DOON, is situated in latitude  $30^{\circ}18'$  north, and in longitude  $78^{\circ}$  east; it is about 60 miles in length from east to west, and 16 miles broad at its widest part. It is bounded on the south by the Sewalick range of hills, and on the north by the Himalayas proper, which are here nearly 8,000 feet above the level of the sea. On the west it is open to the river Jumna, and on the east to the Ganges, the distance between these rivers being about 60 miles."

"In the centre of this flat valley the Koolagirta plantation has been formed. Eight acres were under cultivation in 1847. There were 300 acres planted with tea in 1851 and about 90 more taken in and ready, for many thousands of young Tea plants lately raised from seeds in the plantation.

Mr. Fortune (in 1851) had the same objections to its site as to that of the Anoo and Kooasur Tea Plantations, in the Bheem Tal.

*Guddowli Tea plantation* near Paorie is situated in the province of Eastern Gurhwal, in latitude  $30^{\circ}8'$  north and in longitude  $78^{\circ}45'$  east. It consists of a large tract of terraced land, extending from the bottom of a valley or ravine to more than 1000 feet up the sides of the mountain. Its lowest portion is about 4,300 feet, and its highest 5,300 feet, about the level of the sea; the surrounding mountains appear to be from 7,000 to 8,000 feet high. The plantation has not been measured, but there are, apparently, fully one hundred acres under cultivation. In 1851, there were about 500,000 plants, about 3,400 of which were planted in 1844 and were then in full bearing; the greater portion of the others were much younger, having been planted out only one, two, or three years.

*Hawulbaugh plantation or tea farm* is situated on the banks of the river Kosilla, about six miles north-west from Almorah, the capital of Kumaon. It is about 4,500 feet above the level of the sea. The land is of an undulating character, consisting of gentle slopes and terraces, and reminded Mr. Fortune of some of the best tea-districts in China. Indeed, the hills themselves, in this part of the Himalayas, are very much like those of China, being barren near their summit and fertile on their lower sides. In 1851 thirty-four acres of land were under tea-cultivation here including the adjoining farm of Chullar. Some of the plants appeared to have been planted in 1844; but, as at Paorie, the greater number are only from one to three years old.

The first of these is at a place named Lohba, which is situated in eastern Gurhwal, about fifty miles to the westward of Almorah, and is at an elevation of 5,000 feet above the level of the sea. It is one of the most beautiful spots in this part of the Himalayas.

## DHUNCHEE.

In 1851 a Zemindarge Tea plantation was at *Kutoor*. This is the name of a large district thirty or forty miles northward from Almorah, in the centre of which the old town or village of Byznath stands. It is a fine undulating country consisting of wide valleys, gentle slopes, and little hills, while the whole is intersected by numerous streams.

*The Bhurtpoor Tea Plantation*, in the Bhem Tal in 1851, covered about four and a half acres of terraced land on the hill-side, a little to the eastward of those last noticed. The soil is composed of a light loam, much mixed with small pieces of clay-slate and trap or greenstone of which the adjacent rocks are composed.

*The Russia Tea Plantation*, also in the Bhem Tal in 1851 extended over seventy-five acres, and was formed on sloping land.—*Fortune's Report*, page 383.

(674) DEEN.

Deen, ABAB.

Applied to Mahomedanism, the term Muzhab, relating to the sectarian parts of the Deen.—*Herk*.

(675) DEVEDAH, is the Portuguese, Tamil, and Malayala name of a wood, known to Europeans by that of Cedar of Libanus, or Spanish cedar. This tree is to be found from Cape Comorin, in the south of Malabar, to the north part of Canara. It grows to a large size, from eighteen inches to two feet and a half in diameter, and from thirty to forty feet high. This may be considered a good wood, and might be found useful with the heavy woods in ship-building. The texture of some trees is hard, and might be converted into good plank. It is much used by the natives for house-work and furniture. It is imported into Ceylon, and to the coast of Coromandel, from Pegu and Rangoon, and named Chittagong wood. I need not enter into any further detail of its qualities, as cedar is a common and well-known wood to all Europeans. There is also the Vela Devedah, or white cedar, which grows in the forests of Cochin and Travancore. It may be had in great quantities, and is said to be useful and durable. I know it to be a tough wood for boards, and planks for boats and vessels, for which purpose it is generally used, as well as for house-work. It grows to about two feet in diameter, and from thirty to thirty-five feet high: its grain resembles the red cedar, but it is closer grained and heavier.—*Edye, Mal. and Can.*

(676) DIHOBIES EARTH, is found at Poodoo cottah, Hyderabad, Bellary and Mysore.—*Cat. M. E. of 1857*.

(677) DHUNCHEE; Dhunicha, or Dhunsha. *Sesbania aculeata*; Persoon: is a fibre in high esteem among the natives of Bengal. It seems to be the same as *Aeschynomene cannabina* of Konig; and the *S. Cochinchinensis* from China, and called *Juganti* in Bengal. The plant is hardy,



## DIALS.

growing rapidly from six to ten feet high ; and is considered an ameliorating crop. About thirty pounds of seed is allowed to the acre. It may be sown in poor, low, wet soil, without preparation. The price of Dhunicha in the interior is about Rs. 1-8 per maund. The fibres are from six to seven feet long : but unless cut at a very early period, they are coarser and more harsh than hemp. In Bengal, the fishermen make drag-ropes for their nets, on account of its strength and durability in water. It was valued in England at £35, and would probably always fetch £30 to £35. It is an excellent fibre for common chord and twine purposes and certainly superior to Jute in strength and durability.

*Dhanchi* fibre of Bengal *Sesbania cannabina*, is found wild, but is cultivated in northern India, on account of the fibres of its bark, which are coarse, but more durable than some other substitutes for hemp, especially when exposed to wet, and are therefore employed for the drag ropes and other cordage about fishing nets. The *Sesbania* is a genus of plants of the natural order of Leguminosæ and derives its name from the Arabic name of a species which is indigenous in Egypt ; viz : *S. Egyptiaca* ; this occurs also in India, and is a small but elegant tree : its wood is employed for making the best charcoal, for gun-powder.

(678) *DATURA FASTUOSA* AND *METEL*, &c. Dhatura (white) Kanak (black), Kanak bij (the seed) The seed only used by the natives eaten as a stimulant or given as a narcotic in medicine, or with the intention of robbing or murdering the individual who has taken it ; in the latter case it is given in sweetmeats. The natives do not smoke the plant ; the greatest benefit is however derived from smoking the whole plant in asthma as an antispasmodic and anodyne in other affections of the natives.—*Gen. Med. Top. p. 133.*

(679) DIALS.

### THE FLOWER DIAL.

"T was a lovely thought to mark the hours,  
As they floated in light away,  
By the opening and the folding flowers,  
That laugh to the summer's day.  
Thus had each moment its own rich hue,  
And its graceful cup and bell,  
In whose coloured vase might sleep the dew,  
Like a pearl in an ocean shell.  
To such sweet signs might the time have flowed,  
In a golden current on,  
Ere from the garden, man's first abode,  
The glorious guests were gone.  
So might the days have been brightly told,  
Those days of song and dream,  
When shepherds gathered their flocks of old,  
By the blue Arcadian streams.  
So in those isles of delight, that rest  
Far off in a breezeless main,  
Which many a bark, with a weary guest,  
Has sought, but still in vain,  
Yet is not life, in its real flight,

## DIPTEROCARPEÆ.

Marked thus, even thus, on earth,  
By the closing of one hopes delight,  
And another's gentle birth ?  
Oh ! let us live so that flower by flower,  
Shutting in turn, may leave  
A lingering still for the sunset hour,  
A charm for the shaded eve.

*Mrs. Hemans.*

(680) *DIOSPYROS CORDIFOLIA*. EBENACEÆ, *Roxb. c. 50, Ill. 148.*

Vuckana marum, TAM.

A hard heavy wood, colour brown, said to be very strong, but difficult to work.

(681) *DIOSPYROS EBENASTER*. KÆNIG : EBONY.

Toomoka chava, TEL.  
Abnoos, HIND.  
Atcha wood, ENG.

Kakataetee or Autcha  
marum, TAM.

This very heavy black wood grows in abundance in the Ganjam Circars, and in Berar ; also in Ceylon, where it is called Nuga gaha.—*Ainslie's Mat. Med. p. 206*

Ebony of very superior quality is procurable in these districts as well as the Northern Circars. Mr. Rohde has received 16 inch planks of a fine uniform black. Ebony is much affected by the weather, on which account European cabinet makers seldom use it except in veneer.

The tree bearing the name " Achay " at Madras is *Bauhinia tomentosa*.—*M. E. J. R.*

(682) *DIOSPYROS GLUTINOSA*. EBENACEÆ.

Gaub, HIND. | Panichakai, TAM.

A small tree, bearing a rusty coloured fruit abounding in a glutinous astringent juice, obnoxious to insects and used by book binders, and also for soaking fishing nets in.

(683) *DYOSPYROS EBENUM*, (*Tay, Bur.*) is plentiful in the upper provinces of Birman, growing generally in the neighbourhood of teak : leaf very small. Towards the close of the dry season, the leaves are annually shed, like those of the teak, at a particular season, which distinguishes it prominently, in a country where almost every tree is ever-green. Little use is made of the timber. The specimens brought were black, and of a fine grain, but inferior to that used by our cabinet makers.—*Malcolm's Travels in South Eastern Asia, Vol. I, p. 186.*

(684) *DIOSPYROS MOLLIS*.

Ma-kleu, BURM.

The celebrated vegetable dye, the Shan black dye, is made from the fruit of this species of ebony, which is said to grow on the mountains that separate the Province of Tavoy from the Siamese territories. Isolated plants may be seen in the gardens of Tavoy, and Maulmañ.—*Mason.*

(685) *DIPTEROCARPEÆ*. Dr. Wight gives descriptions of the resiniferous and balsamiferous trees of India. Under the head *Dipterocarpeæ*

## DIVORCE.

he observes—The trees of this order growing in Madras are all natives of the hilly tracts of the Balaghaut. In Sylhet, Chittagong and Pegu where they abound, they occupy the plains. In Java one species *Dipterocarpus (littoralis)* is found on the sea shore.

(686) DIPTEROCARPUS. Two species (*Kunnen-ben* and the *Kun-nyin-se*, Bur.) are two Burmese trees of the same kind, one bearing a white fruit, and the other red. Both are very large trees, and excellent for planks, boats, &c. The boiled sap is a very beautiful varnish. Torches are often dipped in it, to increase their brilliancy, and sometimes made of it, mixed with saw dust. The varnish at Rangoon costs, at retail, four annas a viss, or about 6d. sterling for four pounds.—*Malcolm's South Eastern Asia*, Vol. I, p. 188.

(687) DIPTEROCARPUS GRANDIFLORA. Grows tall and slender, to a prodigious height, throwing out branches only towards the summit. It yields a valuable resin, used in torches, and for paying boats. The timber is excellent, and is used for masts, bridges, and long reaches.—*Malcolm's Travels in South Eastern Asia*, Vol. I, p. 188.

(688) DITA. The sap of this tree is used by the wild tribes of Mindoro, to poison their arrows.

(689) DIVINATION. This is a regular science among Malays who resort to diviners on all occasions of importance—as for instance the almost universal custom in all nations of fixing on a propitious day to commence a journey or any undertaking. The commonest system is analogous to the Roman sortes—a Koran is used for this purpose, they have also books filled with sentences and words, the person consulting them cuts in with a Kris and the sentence marked by the Kris point is interpreted to suit the wants and wishes of all parties.—*Journal of Indian Archipelago*, No. 8, Vol. V, August, 1851.

(690) DIVORCE. Mahomedans in India follow the Koran and Shurra, and marry up to four wives, though some take into their households a far greater number of women, under different designations. Mrs. Meer Hoossain Ally had heard of princes in Hindustan possessing seven or eight hundred, and Tippee Sultau had no less than nine hundred women. In Madras some of these are known as the "*Harm*" which term is there applied to purchased women associating with their lord, but in Hindustan such are termed "*Doolee*" wives. These are not the "*Kuneez*" or slave girls, who are servants. There are three forms of "*Tulaq*" Repudiation or Divorce, amongst Mahomedans in India, 1st. *Tulaq-i-byn*, which consists in the husband only once saying to his wife "I have divorced" you; 2nd. "*Tulaq-i; rujaee*" in repeating the same twice, and 3d. "*Tulaq-i-mootuluqa*" in three similar repetitions.

## DOG. CANIS.

(691) DOG. CANIS. The dog, which is known in Bengal by the name of the Nepal dog, is, properly speaking, a native of the upper and lower Thibets, whence it is usually brought to Nepal. It is a fierce and surly creature, about the size of an English Newfoundland, and covered with thick long hair. It is reckoned to be a good watch-dog, and never to sleep at night. Another animal to be found in the Nepal hills of worthy description is the Dhole or wild-dog. These animals are found in packs varying from fifty to two hundred, and the havoc committed by them among the flocks of sheep and hill cattle is incredible. Their destruction of deer also is immense, and their mode of doing so may be worthy of mention. In size the wild-dog is little larger than the common jackal of India, but longer in the body and possessing much greater power, with a very formidable set of jaws: colour, a rich reddish-brown, with scenting qualities of the highest order.

Soon after nightfall the pack assemble at a given cry, when they disperse in threes and fours in search of game. The first party that hit off the trail, open, when the whole pack rush to them, and when all are assembled fasten to the trail and off they go. The deer soon become alarmed and double, when the pack immediately tell off in parties, each one rushing to the different passes for which deer are known to make, and on the deer attempting to pass either, he is immediately seized by the party, who utter a simultaneous cry, and the whole pack then rush in and the deer is at once devoured. Fresh game is next sought, and in the same way destroyed, and this species of hunting is continued according to the size of pack, till all their appetites are appeased, when they retire to their almost inaccessible fastnesses in the rocks, and remain for three or four days, until hunger again drives them forth on another excursion.

From their destructive qualities, the wild-dogs hardly ever remain longer than a month in the same locality, having in that time effectually scared away all the deer for miles round. Captain Smith never knew them to attack man, and even when severely wounded they will only snap after the manner of a wounded jackal. When deer are not procurable, they will attack even bears.—*Smith's Nepal*. Arthur Grote, Esq., C. S., sent to the Bengal Asiatic Society, the skins and skeletons of a mature female, and male  $\frac{1}{3}$  grown, of the ordinary wild dog so called, of this country, from Chalbasa, Central India. These animals are specifically identical with a particularly fine living adult male sent down from Upper Assam; and this appears to be the ordinary species alike of the Himalaya and of Central and S. India. *Canis Dakhnensis*, Sykes, and *C. Primævus*, Hodgson; and a Malayan specimen in that museum, which is taken to be *C. sumatrensis*, Hardwicke, would appear to



differ only in the considerably deeper tint of its rufous colouring. — *Jour. Asia, Soci. of Beng.* Nov. 1856, p. 440.

(692) DEO-DHUNGA. In a report of the late meeting of the Bengal Asiatic Society, it was announced that a peak situated North East of Kathmandu, and in East Longitude 87° had at length been definitely ascertained by the Surveyor General, Colonel Waugh, to be upwards of 29,000 feet high, and consequently to be the loftiest yet known peak of the Himalaya. That name is Dēva-dhūṅgā, or holy hill. Thus Dēodhūṅgā and Mount Everest are both "about 100 miles N. E. of Kathmandu;" both are midway between Gosainthān and Kaugchun. — *Beng. As. Soc. Jour.* No. V. of 1856.

(693) DHOURAH WOOD.

Dhowra, TEL.

(694) DOLICHOS CATIANY. Red gram. Carramoodloo, TEL. | Kauramanyapayaroo, Bullar, HIND. | TAM.

(695) DOLICHOS CULTRATUS. Red gram. Karamannic, TAM. | Bullar, HIND. Karamoodloo, TEL. |

(696) DOLICHOS CULTRATUS, var, white gram.

Chaday Karamanec, | Kara moodloo, TEL. TAM. | Safaid Bullar HIND.

(697) DOLICHOS FALCATUS.

Itoo mungee tiga, TEL.

Root tuberous. Stems twining, smooth; Leaflets somewhat three-lobed, smooth. Racemes short, few flowered; Legumes linear.

It is common in hedges, thickets, &c., where the soil is rich and moist. Flowers during the cold season. The tuberous roots are cut by the natives into the form of beads, and strung and worn round the neck to cure purging in children. — *Roxb. Flora Indica*, Vol. 3, p. 311.

(698) DOLICHOS GLADIATUS, JACQ.

Coli-averay Kai, TAM. | Chotie sayme ke pullie, DUK.

This valuable legume differs little from the Segapoo averay kai, but in general, does not grow to so large a size. — *Ainslie*, p. 233.

(699) DOLICHOS LABLAB, Lin. DOLICHOS SPICATUS, *Roxb.*

Avery kai, TAM. | Chickoodie kaia, TEL. Saym ke pullie, DUK. |

This pulse the Natives eat as we do French beans (pod and all); it is reckoned excellent in curries and other dishes. — *Ainslie*.

(700) Chotie Sayme ke Pullie, Hind. Dolichos Lablab. — Native Bean. This is a small species of the Dolichos lablab; the legume and seeds are both eaten; it is sown in the rains and sells from one pice or two a seer. — *Riddell*.

(701) DOLICHOS UNIFLORUS, Cooltee, Madras gram.

Woolavaloo, TEL. | Kolloo, TAM. Cooltee, HIND. |

(702) DOMNEEAN, HIND. Female musicians. •

(703) DOONA ZEYLANICA, produces the gum-resin, called by the Cingalese, doon-doo-male.

(704) DOOP or DUP-MARAM, in Malayala and Tamil; it is also named Nadenara, and is to be found in the forests of the coast from north to south. It grows from sixty to eighty feet high, and from two to three feet in diameter. It is a light sort of wood, similar to the white American fir of New England. This is the tree which produces the best description of country dammar, or resin; but it is not so valuable as the dammar from the island of Sumatra. The natives use the large trees as rafts, and as catamarans, and for house-building, and the small spars to make sheds and yards for the native vessels. So long as the moisture of the wood remains, it may be considered to answer these purposes, but when it becomes dry, it is very brittle and of no use.

At Cochin, Edye found the rafters and uprights of the roofs over the ships of war at that port, of this wood, with the purlings of split bamboo over them, and cadjans (cocoa-nut leaves platted), all of which were lashed together by coir yarns. The amount of expense for a roof with sheds was about 350 rupees, or £44 sterling.

One sort of the Dup-maram is named Macdenar, which means long-stringed Dup-maram. It grows to about sixteen inches in diameter, and sixty feet in height. It is not of much use or value.

There is another sort named Paini Dup-maram, which produces a sort of resinous gum. This tree is found in the Cochin and Travancore forests, but is rarely cut down, as the dammar taken from it is valuable, and when mixed with the wood-oil makes the Paini Varnish. This is an article of export to China from Sumatra, where this tree also grows from thirty to fifty feet high, and from two to four feet in diameter, and in greater abundance than on the coast of Malabar. — *Edye, M. and C.*

(705) DRACENA DRACO of Linnæus, affords a similar secretion to that of Calamus draco. A tree of this kind at Teneriffe measures 17 feet in diameter, and is on strong reasons estimated to be 1500 years old. — *O'Shaughnessy*, page 643.

(706) DRAGON BOATS, the name given to the long narrow boats, capable of holding forty to eighty men. These are employed by the Chinese on the festival held on the fifth day of the fifth month usually falling in June, for boat races or rowing matches.

(707) DRAVIDA, or Dravira or Tamul, is the name given to the people and their language occupying the plains of the Carnatic.

(708) DREDGING. "Hints in regard to Dredging observations." The numbers of species, the kinds usually found associating together. The number of living specimens of each. The number of dead. The average

## DRUGS OF TRAVACORE.

## DRUGS OF TRAVANCORE.

age of the specimens, that is, whether young or adult. The general state of the animals and particularly as to the maturity of the eggs or if they have been recently shed. The kind of ground. The depth. The distance from land. The zone whether the (1) Littoral, (2) Laminarian, (3) Coralline, or (4) the Coral. These terms were proposed by the late Professor Edward Forbes, and are fully explained in his writings. 1, the Littoral zone includes the space between high and low water marks: 2, the Laminarian zone is that in which the large tangles or sea weeds flourish and extends from low water mark to a depth of about 15 fathoms. 3, the Coralline zone extends from the depth of 15 to 50 fathoms; sea weeds are scarce, but Corallines abound in this region. 4, the Coral zone is that in which deep sea corals are found and where the depth is beyond 50 fathoms. Any particular currents. What are the mollusca found between tide marks on the neighbouring coast? Is mud present, and if present of what kind? Are any dead shells common of which no living examples occur? What sea-weeds are found? Do the different specimens of the same species vary much in size, form, or colour?

Dredging Paper (partly filled up as a specimen).  
Date ..... October 29, 1859.  
Locality..... Ballaugh, Isle of Man.  
Depth..... Twenty-five fathoms.  
Distance from shore.... Five Miles.

Grounid..... Shelly and gravelly, gravel small.  
Region..... Of Corallines.

SPECIMENS.	No. of living Specimens.	No. of dead Specimens.	OBSERVATIONS.
Nucula-nucleus.....	15	0	In cavities of old shells buried in mud.
Lima hians .....	1	0	In its nest.
Lima Loscombii.....	3	2	Free dead valves thickened.
Pectunculus glycymeris.....	6	7	Young shells common of this species.
Pecten distortus.....	20	6	Both free and fixed; also same with a Byssus.
Psammobia tellinella.....	1	7	Dead shells perforated generally double.
Trochus magus .....	0	2	Much worn.
Trochus Zizyphinus.....	4	0	In gravelly places.

—*Edinburgh New Philosophical Journal*, p. from 206 to 207, New Series, No. 7, Vol. IV. No. July 1856.

(709) DRUGS. Statement showing the Drugs exported from the Madras Territories by Sea for the year 1854.

	Quantity.	Rupees.
Catechu.....	Cwts. 1,369	6,984
Kino.....	66	1,031
Gamboge.....	None.	
Country Sarsaparilla...	269	1,699
Senna.....	404	2,917
Fish oil.....	Gs. 7,21,095	2,06,863
Lemon Grass oil.....	None.	

## (710) DRUGS AND MEDICINAL PRODUCTS OF TRAVANCORE.

Botanical Names.	Malayalim Synonyms.	Parts used.	Abstract of the Diseases in which these drugs are chiefly used.
<i>Abrus precatorius</i> , ... ..	Koonee vayr, ... ..	Seeds and Roots,	Opthalmia. Root a substitute for liquorice. Plentiful.
<i>Acacia arabica</i> , ... ..	Karoovalumputtay, ... ..	Roots and Bark,	Astringent and tonic. Ulcers and cancerous affections.
<i>ferruginea</i> , ... ..	Velvalum pesin, ... ..	Gum, ... ..	
<i>speciosa</i> , ... ..	Vagay puttay, ... ..	Bark, ... ..	Astringent.
<i>Acalypha indica</i> , ... ..	Kooppamunny, ... ..	Whole plant, ... ..	Root cathartic. Leaves used in scabies and cutaneous affections.
<i>Alpinia galanga</i> , ... ..	Kuscholum, ... ..	Roots, ... ..	Substitute for ginger. Used in Fevers, Catarrh and Rheumatism.
<i>racemosa</i> , ... ..	Chittarathay, ... ..	Roots, ... ..	Do.
<i>Anamirta cocculus</i> , ... ..	Poollacorovoo, ... ..	Seeds, ... ..	Poisonous Ointment for cutaneous diseases.
<i>Andropogon muricatum</i> , ... ..	Vettie vayr, ... ..	Roots, ... ..	Stimulant. fevers, bilious affections. Infusion of and oil in gout or rheumatism.
<i>Azadirachta Indica</i> , ... ..	Vapum puttay, ... ..	Bark and Gum, ... ..	Tonic. Fevers. and rheumatism. Leaves in psora. Oil in leprosy. stimulant and anthelmintic.
<i>Acorus calamus aromaticus</i> , ... ..	Vassumboo, ... ..	Roots, ... ..	Aromatic. tonic and purgative. Asthma. dyspepsia, and intermittent fevers.
<i>Adenanthera pavonina</i> , ... ..	Munjadiecooroo, ... ..	Seeds, ... ..	Pulp of seeds in boils and abscesses.
<i>Areca catechu</i> , ... ..	Cash eutty, ... ..	Catechu, ... ..	Astringent, fluxes and ulcers. Nuts astringent and tonic.
<i>Agrostis linearis</i> , ... ..	Arugum kelengoo, ... ..	Roots, ... ..	
<i>Andropogon citratus</i> , ... ..	Ranichum, ... ..	Roots, ... ..	Leaves aromatic. In infusion diaphoretic, used in ring-worm. An essential oil in rheumatism.
<i>Boerhavia diffusa</i> , ... ..	Charcena vayr, ... ..	Roots, ... ..	Laxative. Anthelmintic in infusion.
<i>Barringtonia racemosa</i> , ... ..	Somutrapullum, ... ..	Fruit, ... ..	Sternutatory. Cutaneous complaints.
<i>Butea frondosa</i> , ... ..	Porasum verie, ... ..	Seeds, ... ..	Anthelmintic in tape worms.
<i>Cinnamomum iners</i> , ... ..	Vyana, ... ..	Bark, ... ..	Condiment. Seeds in dysentery and fevers.
<i>Calophyllum inophyllum</i> , ... ..	Pinnaypoo, ... ..	Flowers, ... ..	
<i>Clerodendron serratum</i> , ... ..	Tsjeroothakoo, ... ..	Stem, ... ..	Cephalalgia and opthalmia.
<i>Chavica Roxburghii</i> , ... ..	Thirpeleemoolum, ... ..	Stem, ... ..	Febrifuge. Antispasmodic, in asthma &c.
<i>Coccineum jenesstratum</i> , ... ..	Maramunjel, ... ..	Bark, ... ..	Tonic.
<i>Croton tiglium</i> , ... ..	Naroovallum, ... ..	Seeds, ... ..	Purgative. Apoplexy. Paralysis, dropsy.
<i>Cucumis colocynthis</i> , ... ..	Koomutti kai, ... ..	Fruit, ... ..	
<i>Cathartocarpus fistula</i> , ... ..	Konnay kai, ... ..	Pods, ... ..	Laxative. Roots febrifuge.
<i>Cocos nucifera</i> , ... ..	Thennumpisin, ... ..	Gum, ... ..	
<i>Cassia</i> , ... ..	Teromallay konnay, ... ..	Bark, ... ..	



Botanical Names.	Malaylim Synonyms.	Parts used.	Abstract of the diseases in which these drugs are chiefly used.
<i>Cassia sappan</i> ,...	Chuppangoo,	Stem,	Emmenagogue.
<i>Cassia auriculata</i> ,...	Avery verie,	Seeds,	Pulverised in ophthalmia. Bark astringent.
<i>Cassia sophera</i> ,...	Ponnaverie,	...	Bark in infusion in diabetes. Leaves and Bark in ring-worm
<i>Cocculus cordifolius</i> ,...	Seendie kody,	Root and Stem,	Fever and rheumatism. Ulcers. Jaundice.
<i>Calotropis gigantea</i> ,...	Eriedo vayr,	Root,	Leprosy, cutaneous affections. Alterative and purgative
<i>Cyperus juncifolius</i> ,...	Koren-kelengoo,	Root,	...
<i>Plectranthus cardamomum</i> ,...	Thuckollum,	Seeds Husks,	Cordial, stimulant.
<i>Embellica officinalis</i> ,...	Nellikai,	Fruits,	Infusion in fevers and diabetes. Bark astringent, Diarrhoea.
<i>Flacourtia cataphracta</i> ,...	Talishaputree,	Root,	Astringent. Diarrhoea, dysentery and fevers.
<i>Gaillardina Bonducella</i> ,...	Kalichikai,	Nuts,	Tonic and anthelmintic. Fevers.
<i>Gynandropsis pentaphylla</i> ,...	Thyvala vayr,	Roots,	Leprosy and cutaneous diseases.
<i>Garcinia affinis</i> ,...	Koodoooy pully,	Fruits,	Laxative.
<i>Hydnocarpus inebrians</i> ,...	Marotticooroo,	Seeds,	Oil for Rheumatism.
<i>Hemidesmus indicus</i> ,...	Nanoori vayr,	Roots,	Substitute for Sarsaparilla.
<i>Isora corylifolia</i> ,...	Valambere kai,	Fruit,	Bilious affections: in combination
<i>Indigofera emeaphylla</i> ,...	Chemboo neringie,	Whole plant	Antiscorbutic, diuretic, alterative.
„ aul,	Neelum,	...	Alterative. Hepatitis. Calculus. Powdered in epilepsy and erysipelas.
<i>Ixora coccinea</i> ,...	Sentheythy vayr,	Buds,	Diseases of the kidneys. Externally in cutaneous diseases.
<i>Michellia Rheedii</i> ,...	Chembuga mottoo,	Gum,	Cephalagia Ophthalmia.
<i>Moringa pterygosperma</i> ,...	Moomgo pissin,	...	Cephalalgia, Local to buboes.
<i>Macaranga indica</i> ,...	Vuttathamara pissin,	Bark,	...
<i>Morinda tomentosa</i> ,...	Mungenatee puttay,	...	...
<i>Mimosa abstergens</i> ,...	Cheeya kai,	Pods,	Detergent.
<i>Oldenlandia umbellata</i> ,...	Chaya vayr,	Roots,	Asthma. Cutaneous diseases. Poisonous bites.
<i>Pterocarpus santalinus</i> ,...	Shenchundanum,	Stem,	Hemorrhoids in powder, Externally in scabies and ophthalmia.
<i>Piper nigrum</i> ,...	Chevicum,	Roots,	onic stimulant and cordial.
<i>Pothos officinalis</i> ,...	Athithripelec,	...	Pericarp in leprosy. In infusion in coughs and rheumatism.
<i>Physalis sonnifera</i> ,...	Amookoorum,	Root,	Deobstruent and diuretic, powerfully narcotic.
<i>Pterocarpus marsupium</i> ,...	Oothinvaynga pissin,	Gum,	Tonic
<i>Pavetta indica</i> ,...	Pavetta vayr,	Roots,	Aperient.
<i>Plumbago zeylanica</i> ,...	Kodoovay vayr,	Roots,	...
<i>Pongamia glabra</i> ,...	Pongum,	Roots,	Oil of the seeds in cutaneous eruptions.
<i>Quercus infectoria</i> ,...	Maya kai,	Fruits,	...
<i>Ricinus communis</i> ,...	Amumakooareesee,	Seeds,	Purgative.
<i>Santalum album</i> ,...	Cunthamum,	Stem,	Sedative and cooling. Fevers. Bilious affections.
<i>Strychnos nux vomica</i> ,...	Canjeram vayr,	Roots and Nuts,	Bitter. Intermittent fevers. Paralysis.
<i>Sida retusa</i> ,...	Coorronthotty vayr,	Roots,	Rheumatism.
<i>Sapindus emarginatus</i> ,...	Naey kutton kai,	Fruits,	Expectorant, Epilepsy.
<i>Semecarpus anacardium</i> ,...	Chrancotta,	Nuts,	Rheumatism. Leprosy, and Scrophula.
<i>Strychnos potatorum</i> ,...	Tettan kottay,	Nuts,	Emetic.
<i>Samadera Indica</i> ,...	Karingotta cooroo,	Seeds,	Oil in rheumatism.
<i>Solanum Jacquini</i> ,...	Kunden kutheree,	Whole Plant.	Fruit bitter, expectorant. Consumption and asthma.
„ trilobatum,	Thoothoovay,	...	Consumption.
<i>Tephrosia purpurea</i> ,...	Kolungy vayr,	Roots,	In infusion for checking vomiting; dyspepsia.
<i>Terminalia bellerica</i> ,...	Konica,	...	Intoxicating. Ophthalmia.
<i>Thespesia populnea</i> ,...	Chelanthe puttay,	Bark.	Astringent. Externally in cutaneous complaints.
<i>Terminalia chebula</i> ,...	Kurkada sengoo,	...	Purgative. Ophthalmia. Dropsy, and diabetes.
<i>Tribulus lanuginosus</i> ,...	Naungel,	Whole Plant.	Diuretic. Dropsy and Gonorrhoea.
<i>Vitex negundo</i> ,...	Notely vayr,	Roots,	Intermittent and typhus fevers.
<i>Vernonia anthelmintica</i> ,...	Caatoo seeragum,	Seeds,	Fevers and asthma. Anthelmintic.

(711) DRYABALANOPS CAMPHORA Colebr.

Syn. *Shorea camphorifera*. Roxb. (see *Colebrooke, As. Researches*, vol. xii. p. 535.)

A very large tree, a native of Borneo and Sumatra, where it is sometimes found six to seven feet in diameter.

In the cavities of the trunk there occur collections of solid camphor, and of a light fluid called camphor oil. The solid camphor is often deposited in long pieces, weighing over ten pounds. This camphor is highly prized by the Chinese and Japanese, and so rarely finds its way to Europe that it is seldom found even in the richest collections of *Materia Medica*. Mr. Pereira informs us that he has only met with it twice. Dr. Duncan had specimens, of which he published a detailed and interesting account.

It occurred in tabular plates, readily reduced to powder, compact, ringing when shaken in a bottle; it sinks in water, and does not sublime spontaneously. In these characters it differs from common camphor. (See *Laurus camphora*). The fluid camphor is transparent, pale yellow, bitter, slightly viscid, Sp. Gr. 887. On distillation, it yields a volatile oil, and a camphor-like white substance remains in the retort.—*O'Shaughnessy*, page 220.

(712) DUBDUBEA. The Dubdubea is a Nepaul Wood, abounding in the Terai, which is a powerful astringent, and constitutes an article of trade—*Smith's Five Years*, p. 67.

(713) DUGGY. Round timber in Madras from 20 to 40 feet long 1-to-2½ feet square.

(714) DURGAH, a tomb or shrine. There are two noted ones of this kind near and at



six or ten of their *mōoreeds* (or disciples) on such occasions numerous *fuqeers* are likewise present. The four peers having come to an unanimous conclusion, appoint either one of their disciples, or the son of the deceased, if he be found duly qualified. The days of the Sooltan (Tippoo), the individual in charge of this *durgah* used to receive (by order of the Sooltan) rupees corresponding to the number of masts of the vessels that entered the roads or harbour; for every ship three rupees, patamars, &c. two rupees, *munjee*, &c., one rupee: this rule has been abolished since the place has fallen into the hands of the British. There is likewise a pagoda (or Hindoo place of worship) where a grand annual festival takes place, on which occasion an immense concourse of people assemble.

The second *durgah* is situated at Mangalore, on the banks of the river, and consists of a large long tomb with minarets at each extremity. *Low Lungur Shah* (a *fuqeer*) is buried here, whose name it bears. Lamps are burned here every night, and it is chiefly visited by Malabars (a Hindoo caste), but also by Moosulmans and other Hindoos. Most Hindoos, however, frequent *Sheikh Furreed's durgah*. These *durgahs* are resorted to when people are desirous of being freed from any distemper, misfortune, &c. If the individual who is enshrined in the *durgah* have been wealthy, large dinners are provided, *fatecha* offered, and the food distributed to any who choose to partake of it; there being sometimes *Kunchnee ka taefn* (bands of dancing girls) to entertain the guests. Among the great this takes place on every night of the year (and is never observed in the day time); but among the poorer classes of people, every Monday and Thursday or once a week or month.—*Herklots*.

(715) DUTCH POSSESSIONS IN THE ARCHIPELAGO. The principal revenues of these possessions in the Indian Archipelago are derived from the undermentioned sources, viz.

1st. *Various Imports.*

The capitation of the Chinese, ... .. f.	41,725
The tax on the killing oxen, buffaloes and sheep, ... ..	315,966
"    "    "    hogs, ... ..	156,132
"    on the consumption of fish, ... ..	179,546
Farm of the fisheries, ... ..	155,388
Tax on the consumption of arrack, ... ..	293,882
"    "    palmwine, ... ..	13,244
"    "    indigenous tobacco ... ..	120,000
Bazar (market) duties, ... ..	3,044,974
Tolls, ... ..	81,000
Farm of the small isles in the bay, ... ..	7,812
"    "    Birds nest (Salangane), ... ..	70,004
Pawnbrokers offices, ... ..	334,866

2nd. *Territorial Taxes.*

Land tax of the Javanese communities, ... .. f.	10,047,121
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1st. Various Imports.	
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The tax on the killing oxen, buffaloes and sheep, ... ..	315,966
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Pawnbrokers offices, ... ..	334,866

Land tax of the Javanese com- munes, ... ..	f. 10,047,121
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## DUTCH POSSESSIONS IN INDIA.

Farming of the felling of Wood,...	36,560
Import on the fisheries, ... ..	192,331
Tithe, ... ..	97,741
Land tax on European properties, ...	314,957

### 3rd. Various Receipts.

Tax on imports and exports, ... .. f.	5,171,100
5 per cent. additional for maritime works, ... ..	256,775
Taxes on consumption, ... ..	70,332
" tobacco, ... ..	15,000
" the port and anchorage, ...	96,215
" timber, ... ..	317,434
" succession, ... ..	55,021
" transcription, ... ..	178,625
" private bazars, ... ..	6,098
" passage, ... ..	20,000
Capitation of slaves, ... ..	24,768
Taxes on horses and carriages, ...	66,365
Tributes of the native princes, ...	39,445
Taxes on public auctions, ... ..	290,143
" the Chinese games Pho Topho, ... ..	445,220
The Government printing, ... ..	58,000
Posts, horses, and letters, ... ..	218,722
Monopoly of opium, ... ..	9,560,165
Sale of birds nests (Salangane), ...	221,250
" timber for construction, &c, ...	505,700
Monopoly of Salt, ... ..	4,609,908
Sale of Rice, ... ..	516,525
" Palm Sugar, ... ..	90,620
" Gunny bags, ... ..	167,860
" Gold and gold dust, ... ..	50,900
" Tin, ... ..	3,900,000
" Different articles, ... ..	115,200

It is said that Java and its dependencies reckons 16,000 of chiefs of villages. We have not been able to verify the calculation. We judge it below the effective number.

We learn the following from the Count de Hogendrop relative to the fertility of Java, and to the resources which it offers. Coup-d'œil sur l'isle de Java, published at Brussels in 1830.

"The soil of Java does not present any products which are exclusively proper to it, but such is its happy fecundity, such is the goodness of its climate that all the productions which Providence has granted to other countries situated between the tropics, can be transplanted there and cultivated with success. If the imperfect knowledge and limited means of the Javanese have only until now permitted them to cultivate rice, coffee, tobacco, sirc, katchany, maize and a little cotton, we may reasonably hope that a gentle and enlightened persuasion, will easily lead them also to cultivate pepper, gambier, cardamums, and the many kinds of tobacco and cotton on procuring for this purpose seeds from Virginia and Brazil; whilst the culture and the manufacture of indigo, sugar, the extensive culture of cotton, coffee, tobacco, the manufacture

## DYAKS.

of potass, of rum, &c, may furnish to European industry powerful means of augmenting products suited to exterior commerce and immense sources of riches and prosperity."

We further add what the same author tells us, "That in 1830, we could calculate that only two-ninths of Java were cultivated, and that the other seven-ninths still presented a vast field for improvement;" which this judicious observer is of opinion "should be introduced with discernment, and without hurting or shackling the system of duties followed in this country."

Imports into Java and Madura in 1843.

The whole private Imports from Java and Madura, amounted to :

Merchandize, ... ..	f. 21,980,792
Gold and Silver specie, ... ..	570,596

Total f. 22,551,388

Exports of Java and Madura in 1843.

The whole private Exports has amounted to :

In Merchandize, ... ..	f. 58,159,237
Specie, ... ..	833,599

Total f. 58,992,836

—From No. IV. October 1857, *Journal of Indian Archipelago*, reviewing *Temminck's General View of the Dutch possessions in the Indian Archipelago*, page 212.

(716) DYAKS. The people thus denominated must not be confounded with the Daya of the west coast. They inhabit the borders of the river of Banjermassing and some of the other southern rivers, and their proper designation is Ngajur or Blaju. They are also called Kahayan from the great river of that name.

The notions of the Dyaks respecting the spiritual world are in general much confused and at variance with each other. They agree however in the belief in good and evil spirits. The good spirits are divided into two classes, viz. spirits of the world above or of the higher regions, who are comprised under the collective denomination of "Lengiang," and spirits of the lower regions, or more properly such as have their dominion in the waters, in great rivers, and those are called "Jata." The collective name of the evil spirits is "Talepapa," which word signifies in general all bad things.

It is to be observed here that the Dyaks describe the aspect of the regions above as similar to the terrestrial world. Mountains, valleys, streams, lakes &c., &c, are found there as well as here beneath, and the dominions of various spirits are bounded by the different streams and branches of the rivers.—*The Mythology of the Dyaks. By the Rev. T. T. Beeker, Missionary on the South Coast of Borneo.—Journ. of the Ind. Arch. Vol. III, No. 2 of Feb. 1849, page 102.*

(717) **DYEING WITH CHAY-ROOT.** The following is an extract from Dr. Heyne's description of dyeing cotton yarn with chay-root.

The yarn being washed and untwisted that it may not become entangled and being so separated that every part may be equally penetrated by the colouring matter, is divided into bundles of thirty or forty threads, through each of which at the middle and extremities a cotton thread is loosely sewed but so as to allow of every thread being exposed to the sun's rays when hung up and the threads spread out on a bamboo.

The yarn is washed and cleansed in cold water aided by half an hour's manipulation, it is then kept in water in covered vessels till it acquires a putrid smell which takes place in from twenty-four to thirty-six hours, during which it is occasionally pressed and worked for a quarter of an hour together, it is then to be washed as clean as possible, beaten on a stone or earthen pot and then hung up to dry.

While this process is going on a lye is prepared of the ashes of the plantain or other tree in cold water, it is an object to have this lye of sufficient strength which is determined by adding to a small quantity about half as much gingilie oil and giving to it a gentle motion: should it turn immediately white having no visible globules of oil swimming on the surface it is good.

The quantity required of clean lye being poured off and strained, sheep dung in the proportion of three ounces to a pint of lye is dissolved in one half of it and this solution is again strained. The other half of the lye is mixed with half its bulk of gingilie oil and half as much tsiky (the saponaceous water procured during and retained from former process being in fact a solution of soap in water) the two liquors are then mixed together and if things are favorable a milky scum arises.

The proportions required for say half a pound of a yarn would be gingilie oil half a pint by two pints, tsiky, (soapy liquor from former process) a quarter of a pint, sheep dung two or three ounces.

The yarn having been thoroughly imbued with this mordant is dried in the sun for some hours, it is then again soaked and dried as before. The same night it is treated with an additional portion of mordant; is put into covered vessels and allowed to remain till morning. If any mordant remain the same process is again repeated.

The yarn is at night moistened with the lye first prepared diluted with one-third of its bulk of water and put into covered vessels. The yarn in drying, it should be remarked, should have the position constantly changed to prevent the mordants or lye from accumulating in the lower part.

Next day the yarn is spread out to dry on the bamboo, it is taken in at night and treated with lye, this alternate soaking or thorough moisten-

ing with lye at night and exposure during the day are continued without intermission till the yarn appears saturated with lye, or in fact till the oil is converted into soap, this if the lye is sufficiently strong may occupy five days. This is ascertained by washing a few inches from off the bundle in water holding some astringent in solution a whitish scum will arise, and it is from the feeling of this scum when worked between the hands, and the appearance of it afterwards that they determine the state, the workman being satisfied of the completion of this process, the yarn is again moistened for one day, morning and evening, with much diluted lye or plain water. The yarn may be immediately washed but the process is much improved by retaining it for some weeks probably to allow the anamalizing matter to get fixed.

Before washing it thoroughly the yarn is washed in a small quantity of water which receiving the soapy particles in solution is retained by the dyer under the denomination of tsiky, it gradually acquires some consistence and a disagreeable smell.

The yarn is then washed in a tank till nothing of the mordant seemingly remains, but the smell and a certain softness to the touch.

Occasionally the whole process is again repeated.

The yarn being thus thoroughly impregnated with the mordant, a cold infusion of cassah leaves in water is made, and after some hours the yarn is put into it and handled in such a manner as to expose every thread to its action, it is allowed to remain therein all night, the quantity of leaf used in the infusion is so great that it resembles a paste.

Next morning the water is wrung out from the yarn, the adhering leaves are shaken off and fresh ones with an equal quantity of chay-root substituted for half a pound of yarn, a handful of each is sufficient: after two hours the yarn is laid in the liquor.

The same process is repeated on the third day; by this time the yarn usually changes to a reddish yellow colour with occasional red spots, a liquor in which to soak the yarn is now prepared of a handful of chayroot in water.

On the fourth day the yarn will appear in the evening of a light red colour, it is to be treated in the same manner as on preceding days and a similar liquor to the last named is prepared for soaking it in at night.

On the fifth day the yarn is washed in a tank and afterwards dried in the sun: as usual for soaking it in at night, a liquor is prepared of pounded cassah leaves mixed with gingilie oil sufficient to form a dry paste of which about half an ounce is mixed in the usual portion of water after standing two hours a handful of chayroot is added and the yarn immediately immersed for the night.



## DYEING.

The mode of proceeding on the sixth day is precisely similar, but the liquor for the night is prepared wholly of chayroot.

On the seventh day the yarn is again washed, dried, &c. on this and the next day it is immersed in a liquor composed of equal parts of cassah leaves and chayroot in water.

The yarn is now boiled in a liquor composed of that strained from it at the last night's process with the addition of chay-root a handful for half a pound of yarn and sufficient water to give room to agitate the yarn freely. The pot containing the liquor is placed on the fire which is kept up briskly till it begins to boil, it is then kept simmering till a rose colored froth rises and covers the surface when the fire is withdrawn and the pot with its contents allowed to cool gradually; during the boiling, the contents of the pot is stirred quickly so as to expose the yarn as little as possible to the action of the air, when cold the yarn is taken out and washed in a tank beaten as usual and dried in the sun; its colour should be a bright and lively red, if it fails it is occasionally brightened by steeping once more in a liquor composed with cassah leaves and chayroot, the former being mixed first with a little gingilie oil, a temporary brilliancy is further given by putting it in a cold infusion of safar wood.

The process appears to have been introduced for nearly eighty years into Europe: of late, improvements have been made but the process is still a tedious one: in Ure's Dictionary of Arts under "Madder," several processes are described with minuteness: the following is one in which the several processes in use at Elberfoia are enumerated.

1. Cleaning the cotton by boiling in a weak alkaline bath for four hours; cooling and rinsing.

2. Working it thoroughly four times over in a steep consisting of 300 lbs. of water, 15 lbs. of potash, 1 pailful of sheep's dung, and 12½ lbs. olive oil, in which it should remain during night. Next day it is drained for an hour, wrung out and dried, this treatment with the dung steep and drying is repeated three times.

3. It is now worked in a bath containing 120 quarts of water, 18 lbs. of potash and six quarts of olive oil, then wrung out and dried, this steep is repeated four times.

4. Steeping for a night in the river is the next process; a slight rinsing wringing and drying in the air.

## DYEING.

5. Bath made of a decoction at 100° F. of semul and not galls in which the goods remain during the night, they are then strongly wrung and dried in the air.

6. Aluming with the addition of potash and chalk; wringing, working it well through this bath where it is left during the night.

7. Draining, and strong rinsing, the following day piling up in a water cistern.

8. Rinsing repeated next day and steeping in water to remove any excess of alum from the fibres, the goods continue in the water till taken to the dyeing bath.

9. The maddering is made with addition of blood, sumach and nut galls, the bath is brought to the boil in 1¼ hour and kept boiling for an half an hour.

10. The yarn is rinsed, dried, boiled from 24 to 36 hours in a covered copper, with an oily alkaline liquid; then rinsed twice, laid two days in clean water and dried.

11. Finally the greatest brightness is attained by boiling for three or four hours in a soap bath containing muriate of tin, after which the yarn is rinsed twice, over steeped, and dried.—*Ure's Dictionary of Arts.*

This is an instance of the very little progress that art has made in simplifying a process which at first sight seems unnecessarily tedious, the superiority in the result is I think chiefly to be attributed to the solution of salts of tin used to brighten the colours.

In many parts the roots of the morinda umbellata are employed instead of chay-root in dyeing cotton yarn red, the colour is neither so bright or so durable. Dr. Heyne describes the process. Take 3½ lbs. of white cotton yarn and soak it in 1½ lb. of gingilie oil: a strong lye made of the ashes of the milk hedge, and the yarn steeped in it for four nights being dried in the sun during the day, it is then washed in brackish water and dried in the sun.

Five seers (kutchu 13¼ lb. ?) of togara root finely powdered are put into a pot of water together with the yarn and kept all night over a fire of cowdung, in the morning it is taken out and dried in the sun, the same process is repeated for two successive days and nights which completes the process. It is probable that a superior dye might be obtained if the same nicities were observed as in dyeing with chay-root.—*Rhode, M.S.S.*

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(718) EARTHQUAKE. A severe Earthquake was experienced in Batavia, and over an extensive region in Java, on the 16th of November 1847.—*Journ. of the Indi. Archipelago*, December, 1857, page 361.

(719) EDANAH the Tamil name of a Malabar tree that grows to about forty feet in height, and two and a half in diameter. It is very soft, and not durable: it produces a sort of gum, or resin, like the Payane. The wood is used for catamarans, rafts for heavy timber, canoes, spars for sheds, and other purposes.—*Edge, M. and C.*

(720) EDELLAH, the Malayala name of a tree which grows to about thirty feet high, and twelve inches in diameter. It is used in boats and country vessels; and is designated jungle wood. In consequence of its scarcity it is not much known or used.—*Edge, M. and C.*

(721) EED: ARAB. There are five Eeds, or feasts, held annually by Mahomedans. The two principal ones are the Rumzan feast or Eed-ool-fitr and the Buqr-eed; which are Furz and Soonnut, i. e. commanded to be observed both by God and Mahomed. The other three are, Mohurram, Akhree-char shumbah and Shab-i-burat, which are only soonnut, or commanded by Mahomed.—*Herkl.*

(722) EED-GAH or NUMAZ-GAH, lit: a place of festival or of prayer: a building generally situated without the walls of a town (often amidst gardens), erected on a platform or a pediment three or four feet above the level of the ground, and on an eminence, consisting of a square wall with two or more minarets, and having in the centre, on a level with the ground, three steps, which forms the *mimbar* (or pulpit), from which the *khootba* (or sermon) is read on particular occasions, or on particular feast days, such as those of *buqr-eed* and *rumzan kee eed*, which occupies from an hour and a half to two hours. It is said that the Arabian Prophet, in addressing the congregation, stood on the uppermost step; *Abu Bakur* (his successor) on the second; *Oomur* on the third or lowest; but *Oosman*, observing that at this rate we might descend to the bowels of the earth, fixed upon the middle as the one from which to deliver the sermon; since then it has continued so. This building is merely intended as a signal post for people to assemble at to hear the *Khootba* read. A bamboo, or any other post might answer the same purpose, but a brick building is usually preferred, as being more durable, and affording individuals an opportunity of handing down their names to posterity, by being at the expence of erecting them. It is by no means a sacred edifice.—*Herkl.*

(723) EED-OOI-FIFTR, or Rumzan kee Eed, a mahomedan festival, held on the first day of the tenth month Shuwal.

(724) EEDFEE, Hind, School Holiday.

(725) EHRETIA BUXIFOLIA. ROXB. Root of the Box leaved Ehretia.

Cooroovingie vayr, TAM. | Pale ke jurr, DUK.

This root has, in its more succulent state, a sweetish and somewhat warm taste; and is reckoned by the Vyteans amongst those medicines which assist in altering and purifying the habit in cases of cachexia, and venereal affections of long standing. It is commonly prescribed in decoction. The Hakeems consider it as an antidote to vegetable poisons.—*Ain's Mat. Med.* p. 77.

(726) EHRETIA ARENARIA, Sand Ehretia; Griffith, which is found between 12° and 28° N. L. binds together loose sand, in a minor degree. It may be the same as Ehretia (X) cuneata? Wight Icon. Vol. IV. t. 1385 which grows on sand banks in the beds of all our rivers. *Cleghorn.*

(727) ELÆOCOCCA VERNICIA. Dryandra Vernicia, CORR. The varnish tree of China.

(728) ELAVUM, the Tamil name of the wild cotton tree, which grows to sixty or eighty feet high, and from four to six feet in diameter. It is a very soft, light wood, and used by the natives for catamarans and canoes; and also for rafting the heavy timber from the forests: it is not durable or of much value.—*Edge, M. and C.*

(729) ELEPHANTS. The catching and taming of wild elephants furnish a large source of revenue to the Nepaul government. In taking them, the taroos or elephant catchers, having marked down a wild herd of three hundred or four hundred elephants, the following preparations are made. About two hundred taroos collect together, mounted upon elephants, and accompanied by two large "taking elephants," highly fed, and thereby kept always must (sensual.) The herd of wild elephants having been started, they get away trumpeting and whistling into the thickest part of the forest, hotly pursued by the mounted taroos, each of whom is provided with three or more nooses, called the moosack, which is made of very strong ran hide, well soaked in oil, and so ingeniously contrived, that when once attached to the elephant, the hind legs are gradually drawn together at every step he takes, until he is brought to a complete standstill. The chase continues frequently for twenty miles at full speed, until in fact, the wild herd becomes blown and is brought to a stand. The danger then commences, from the wild ones dashing at their pursuers, in their turn causing the



## EMBROIDERY.

most intense excitement during half an hour, until the arrival of the two must elephants whose bulk prevents their keeping up with the more active ones, ridden by the taroos. These two elephants, each having three keepers upon their backs, dash into the herd. Their appearance, accompanied by the powerful nauseous odour emitted by must elephants, creates an immediate panic among the wild ones and soon paralyzes their efforts of resistance. The active little taroos now slide down from their steeds, and under cover of one of the must elephants, who pushes himself forcibly against the wild one selected from the herd, they, in a most dexterous and daring manner, slip the moosack on to each of the hind legs, which performance occupies about three minutes. The noosed elephant is then allowed to depart, and he goes off evidently delighted; but as the noose becomes contracted at every stride, he finds his intended flight brought to a close, at a distance of sixty or seventy yards. After operating upon about fifty wild Elephants in a similar manner, the Taroos permit the remainder of the herd to abscond, and employ themselves in fastening the noosed elephants to separate trees, where they are detained from two to three weeks under the careful charge of the takers. If any of the captured show symptoms of violence, they are immediately punished most severely by two of the large tame elephants, who belabour them unmercifully with their trunks. Two such thrashings effectually cure the most insubordinate, and at the expiration of six weeks, the once free and independant denizen of the forest has a keeper on his back, and becomes as quiet as if he had been in a state of subjection all his life.

As Chittagong is renowned for the beauty and size of its elephants, so is Nepaul celebrated for the hardness and ugliness of her produce: a fatal peculiarity extending to the Nepaulese themselves. The full-grown female elephants seldom exceed seven feet and a half in height, but the males of forty years old, at which age they are considered to be full-grown, are fine fellows, averaging from nine to eleven feet. One elephant was eleven feet four inches in stature.—*Smith's Nepaul.*

(730) **ELOOPIE** OR **ELUPE MARAM.** The Malayala name of a tree which grows to fifty feet in height, and two and a half feet in diameter. It is said to be a useful timber, and is found to be durable in native vessels for planks, beams, &c. It produces a fruit from which an oil is extracted, which is used for lamps and other purposes.—*Edye, M. and C.*

(731) **EMBROIDERY.** In Southern India this art is practiced, chiefly, at the towns of Tanjore, Madras, and Secunderabad. The Tanjore, and Madras works are of very superior in quality. Under this head may be classed a variety of fancy articles of great merit particularly pocket handkerchiefs, and worked muslin dresses,

## ENTOMOLOGY.

scarfs which show great taste in the patterns and beautiful finish.

*Embroidery in Gold.*—This art furnishes some of the most gorgeous and expensive manufactures for which India has been long celebrated. The taste and judgment evinced in the blending of brilliant colors and contrasting them with gold and silver on grounds of velvet, satin, silk, or muslin, proves that in this manufacture, India stands unrivalled. Some are very gorgeous Shaminahs and Elephant saddle cloths.

*Embroidery in Silver.* The *Gold and Silver Fancy Fringes of Hyderabad* are deserving of mention. Small samples of *Solid Silver wire Fringes and Ornaments* from Madura deserve notice, but they are surpassed by the silver thread of Hyderabad.

(732) **ENGELHARDTIA LESCHEN.** This plant grows well in the plains of the North West Provinces but does not fruit.

(733) **ENTOMOLOGY** of the Himalayas and India.

*Influence of Temperature and of Moisture.*—In those regions of the world where we find a multiplicity of genera of animals, united with a prolificness of species, we may naturally imagine that circumstances are admirably suited to their existence; and, on the contrary, where we find a small number of genera, and in many instances a diminutive form, and a paucity of individuals, we arrive at an opposite conclusion. Now, if we search for the cause of these discrepancies, we shall find it to depend in a great measure on the influence of temperature. Let us examine, then, in what portion of the globe a superfecundity of organized life exists. Certainly not at the poles, or even in the temperate zones; to the tropical and equatorial regions we must next proceed, and it is there, in those warmer districts of the earth that we find the energies of life more early developed, and vigour and productiveness seem the characteristics of the clime. These remarks apply not less to animal than to vegetable life, for no where do the Herbivora abound more than in warm regions, and no where do we meet with more luxuriance of foliage, or a greater exuberance of arboreal vegetation, than within the tropics. As we recede from the equator, and approximate to the poles, temperature gradually diminishes; and probably nearly in the same proportion as heat decreases, so shall we find the decrease of animal and vegetable species, till we arrive at that degree of cold where vegetation is stunted, circulation languid, animation becomes suspended, and existence is scarcely tenable, if not actually destroyed.

To obviate the effects occasioned by a low temperature, some animals burrow in the earth, and pass the winter in inactivity and torpor; others again, gifted with extraordinary locomotive powers, migrate into milder regions in quest of

food, which the rigour of a brumal season and a northern climate has rendered precarious. It appears an observation worthy of attention, that at the very period the migratory birds visit the south. Insects are already teeming into life, while vegetation has arrived at a state of forwardness sufficient to support, as it were, the expected increase of animal beings. We infer, then, that as vegetation is apparently regulated and influenced by temperature, so animalization is in a measure dependent on vegetation as a secondary cause. It may naturally be expected, in a gigantic country like India, whose superficial area is nearly one million and a half of miles in extent, that great diversities of climate will be found; and when we take into our consideration the altitude of its mountains, surpassing in grandeur the Andes of the American world, we may expect every gradation of temperature which can occur, from the intense cold of the eternally snow-capped height, to the baneful heat of the tropical valley. The elevation of the land above the ocean, the height and direction of its mountain ranges promoting or checking radiation, its mighty rivers and interminable jungles, its soil, strata, and arid deserts, absorbing and radiating heat, exert their varied influences, and modify the temperature of that extensive Continent; and yet, admitting thus much, I cannot help stating an opinion, that according to the extent of the country, no other portion of the globe enjoys a more general and equable uniformity of temperature than India. This may satisfactorily be proved, provided we take as the basis of our argument the wide range of region, over which not individual species, but whole genera of Insects extend, and the general uniformity of oriental vegetation. Before dismissing the important subject of temperature, it is necessary to offer a few remarks on the variation of heat and cold throughout the summers and winters in the Himalayas and in India. In the former Dr. Royle states, in his admirable pages, that the Flora of the Himalayas in the spring and summer of the year resembles that of Europe, while in the rainy season it becomes intermixed with tropic-like vegetation; and hence there is a certain admixture of genera belonging to temperate and tropical climes. The change of temperature and of moisture producing a new vegetation, exercises a corresponding influence over the distribution of Insects throughout the same country; and consequently we have reason to expect, as will afterwards appear in these remarks, that its entomological character is also twofold, uniting in itself that of both zones. This intermingling of genera of tropical and temperate regions will ever probably be found more perceptible in the rainy season, in advancing from the valley to the mountain height; and perhaps we ought to know the results of the following researches, before we attempt to arrive at any conclusion respecting the distribution of

animal groups in the Himalayas or in India. It was therefore suggested to future travellers in these magnificent regions, first, to endeavour to ascertain the differences of climate, and the causes which affect its temperature; secondly, to find out the average limit to which tropical forms extend, to state where they most abound, where begin to lessen, and finally terminate; thirdly, to note in what proportions the genera of tropical and temperate climes are intermingled; fourthly, at what altitude temperate forms predominate over tropical; and, lastly, to mention as nearly as it is possible the range of any group of animals in preference to that of any individual species: both objects, however, are desirable. In addition to the above desiderata, it will be necessary to note the seasons of Insects and times of their appearance, the soil in which they are found, and the vegetation upon which they live; since the distribution of animals in general is greatly dependent on food, which food will abound, or be found deficient, according to the richness or poverty of the soil, or according as the degrees of heat and moisture influence the same. It appears to me, that it is chiefly in swamps, and in low and marshy lands acted on by the rays of the sun, where there is a union of heat and moisture, that the major part of Insects seem particularly to flourish. In such localities we find genera more abundant, a great increase of species, the number of individuals prodigiously augmented, and the energies of life more rapidly developed. Animals appear more than usually productive, either in the alluvium of mighty rivers, or in the tropical jungle. It was on the banks of the Nile, amid its slime, acted on by the influence of the sun, that the doctrine of spontaneous generation originated, and we are told also entertained by the ancient Brahmaus on the banks of the Ganges, as seen in *Susruta*. It is in like situations, where heat and moisture predominate, that nature still exhibits her surpassing and inexhaustible fecundity.

If we next turn our attention to the tropical jungle, we meet there with nearly an equally teeming exuberance and productiveness of species. The heavy tropical rains saturating the accumulated mass of heated leaves, and vegetable matter, considerable vapour is produced peculiarly adapted to increase insect life; and it is not a little singular, that as soon as the first showers fall in these regions, all nature becomes reanimate; and as the rains increase, so do the Insects in proportion more and more, till the rainy season fairly sets in, at which period the jungle and the forest literally teem with myriads of insect population, more numerous than the stars of heaven, and as countless as the sands of the sea-shore. In concluding this part of my subject, I need only repeat shortly, that heat and moisture combined, exercise a powerful control over the geographi-



cal distribution of insect life, and that this distribution is also influenced in a greater or less degree by vegetation, as well as by the soil of a country; but these are subjects which require further elucidation.

*Influence of vegetation.*—The entomologist who wishes for accurate information respecting the geographical distribution of Insects over the wide extent of our globe, must take into his consideration not only the influence of temperature, but that of vegetation; nor should he omit to note the varieties of soil which materially influence it. The dependence of this distribution of animals, although greatly swayed by temperature, is no less so by the supply of food and nourishment they can obtain. Insects are designated according to the kind of food they consume, as carnivorous or phytyvorous; and in proportion as food is ample or deficient, so probably they abound in numbers, or decrease and vary in magnitude and form. To its abundance we may in some measure attribute size, to its deficiency the frequency of dwarfishness of stature, immaturity, and many of the numerous crippled specimens, as also some of the monstrosities found in our collections. The great Latreille has justly observed, that where the empire of Flora ends, there also terminates that of Zoology; and there is little doubt, that where vegetation is richest, there animal groups also will be found most abundant in genera, species, and individuals, not only those which are herbivorous, but those also which are carnivorous.

It is not the intention here to enter into any details respecting the Himalayan or Indian Flora. If the reader requires information on these points, we refer him at once to the accurate and invaluable pages of Dr. Wallich and Dr. Royle; and as we at present look merely to the vegetation, as influencing in a great measure the character of the entomology of the country, a concise outline of the leading features of the Botany of those regions is all that is here requisite. Throughout India, according to the above authorities, there appears to be an uniformity of vegetation, tropical species greatly predominating over those of the temperate zones; there occurs also a considerable admixture of genera belonging to temperate climes, and at a high elevation plants abound, which are indicative of Alpine regions. Several genera appear common to Europe, North America, and India; and in some instances identical species have been recognized as existing in Europe and in Asia, as well as in the New World. It still remains, however, with the botanist to determine the similarity of vegetation in Western India and Africa, a similarity which it is anticipated will be eventually found to exist, if not at present actually known—a similarity this writer is led to suspect solely from observing a great resemblance in the character of the

entomology of Western India and Eastern Africa. Vide p. 159 of the "Illustrations," where the similarity of vegetation in parts of India and in Western Africa is referred to, as originally remarked by Mr. Brown, and which has been confirmed by subsequent discoveries.—*J. F. R.* In many instances cognate species of Insects appear both in Africa and Asia, which, by a careless observer, might be considered only as varieties; they are, however, on examination, sufficiently distinct, and he therefore thinks himself justified in esteeming them the representatives of their respective countries, as undoubtedly they fulfil the same offices and functions in both. In several cases we meet with identity of species in Asia and Africa; and there is an observation he has made, worthy of still further investigation, that most of the Insects which are identical in both countries, are either coprophagous or phytyphagous; in short, vegetable feeders, which circumstance would lead one to suppose a similarity of vegetation in the different regions.

The writer thus continues: It may here be expected, perhaps, that I should state the relative proportions of the carnivorous and phytyvorous Insects; and I cannot but regret that I have not as yet followed up my investigations sufficiently to enable me to draw a satisfactory conclusion. Messrs. Kirby and Spence, in their interesting work, speaking of our British Fauna, esteem these groups as nearly equal in number. I must confess my own observation induces me to believe, that the latter greatly exceed the former in our own country. With respect to the phytyvorous group in tropical climates, they certainly greatly out-number the carnivorous; and were it not so, the air in those regions would scarcely be habitable, considering the nauseating effluvia arising from excrementous matter, which the Copridæ in particular tend to neutralise, by consuming, decomposing, and burying in the earth, all that is obnoxious and liable to putrify. In proof of this assertion, I will only here add, that five of the greatest groups with which we are acquainted, namely, the Lamellicornes, the Sternoxes, and the Longicornes, the Curculionidæ and Chrysomelidæ, are almost entirely phytyvorous or xylobious; and it may also be naturally inferred from the superabundance of animal life of all classes within the tropics, particularly the Ruminantia, that there also vegetation will be found most luxuriant; yet, looking to Insects only, we find they are scarcely sufficient to keep in check its excessive exuberance. In addition to multiplied forms of genera, we have an extraordinary increase of species and of individuals. It is in these same prolific regions also, that the mighty Goliath and gigantic Prioidæ abound, where they perforate the trunks of the proudest monarchs of the forest, and hasten them onward to decay; and, by means apparently inefficient, check vegetation. It is time,

however, to add a remark on the carnivorous Insects, which, although inferior in numbers to the phytivorous, are still an important group; and in northern regions, by removing the decomposing matter from the decaying and putrifying carcass, fulfil the functions assigned to them by Providence. In tropical regions they are certainly not always so abundant, as a dead body, from the natural dryness of the air, and intense heat of the sun, is frequently dried up before putridity has made much progress; at least such is the case in the Pampas. I cannot help thinking, however, although our cabinets contain but few species from equinoctial and tropical latitudes that eventually they will be found more numerous, and that in these regions we shall still find them more proportioned to the excess of animal life than appears to be the case at present. Religious prejudice, and the filthy and disgusting habits of these Insects, may be the causes why they have been neglected. In India, if the Necrophaga are not so numerous as elsewhere, yet the numbers of some particular species being excessive beyond measure, are sufficient, perhaps, to compensate for want of variety.

*Range.*—In the consideration of the geographical distribution of Insects, especial notice should be taken of the range over which genera and families extend. From want of attention to this subject, entomologists have not sufficient data to form any just views respecting it. Every naturalist who has studied animals, must be aware that certain tribes, genera, and species are peculiar to particular regions of the globe. On the contrary, in various countries of the earth the Botanist meets with genera of plants which are common to Europe, and the other quarters of the globe, to the Old World as well as to the New. In some instances, identity of species has been recognized in countries remotely situated, between which seas and oceans intervene. It becomes, then, a question of considerable importance to determine if any species of plants have an unlimited or universal range, as probably all those insect races which feed on vegetables are regulated in their distribution by the same laws which govern the distribution of the plants themselves. It must be evident even to the most careless observer, that where the climate is materially changed in temperature, that there vegetation will be proportionately altered, and I imagine that eventually the entomological character of a country will be found much more dependent upon vegetation than has hitherto been allowed. It is true, indeed, that although two countries may agree in temperature and botanical character, the Insects may be totally different in form and appearance; but, in looking to their functions, if we find them the same, or nearly the same, we at once acknowledge the resemblance, and imagine they take the place of other known and existing groups elsewhere; a resemblance

of character, which Messrs. Kirby and Spence have very properly denominated representation, which representation will even be more perceptible as the soil and general characters of the countries accord.

*Influence of Soil.*—Having already seen that both temperature and vegetation exercise a powerful control over the geographical distribution of insect races, there still remains a third subject of inquiry, namely, the influence of soil over the same groups. If we find that in particular rich soils various genera of Insects abound, and that in others of an inferior quality scarcely a species can be met with, may we not naturally infer that there must be some peculiarity in it, and that the animal groups are influenced by their attachment to the same? The Botanist readily admits that vegetation is materially influenced by it, but as yet the Zoologist has made little inquiry respecting this subject, replete as it ever must be with high interest, and well worth most serious attention. Without entering deeply into the geology of India, I may state, on the authority of Colonel Sykes, that the character of the geology of great part of the Peninsula, like that of its vegetation, presents considerable uniformity: unacquainted with its leading features, I can derive my observations respecting it solely from the examination of the genera before me. I will, therefore, merely give concisely what groups attach themselves to particular soils in different countries, and hope that the attempt, imperfect as it is, may induce other naturalists to undertake an inquiry which must lead to very important results. As the mountain, the valley, and the plain, have their own peculiar temperature, vegetation, and soil, they have also particular groups of animals attached to them; and if we look more closely, we shall find that particular families and genera are always to be met with in certain strata and soils, evincing, as it were, a partiality and adaptation, by frequenting and thriving in them.

It may here be worth while to specify some of the genera of Insects attendant on the difference of soil. It is in the sandy districts of our own country that the few species of *Cicindela*, peculiar to our island, occur. *Cicindela maritima*, however, prefers the vicinity of the sea-shore, while several Oriental species, remarkable for their beauty and colouring, delight more in the alluvial soil of rivers. Frequenting the sandy heath are found the splendid *Chlorion*, the fetid *Sphex*, and restless *Ammophilus*, associated with numerous species of *Andrena* and *Nomada*. In the sand, washed from the mountain height, at the sources of our European rivers, some species of *Nebria* and *Psammodytes* are exceedingly abundant. If we visit the parched and burning sands of Africa, we there meet with the rapacious *Anthia*, the desert-loving *Graphiptera*, the burrowing *Scarites*, and countless species of *Heteromera*



and Tetramera. In the same soil also, on the banks of rivers, the genera Epaphius and Trechus, Clivina and Dyschirius, are not unfrequent. On the sand of the sea-shore, Broschus, Bradytus, Pedinus, and Egialia, occur in extraordinary numbers; and where it is habitually covered with salt water at the departure of the tide, we capture Cilleum, Pogonus, Hesperophilus, and Heterocerus, the singularly-formed Bledius, and wonderfully-abundant Ophonus pubescens, all of which I have reason to believe can live submerged beneath the sea a considerable period. Of all other soils, *clay*, (Mr. Shuckhard informs me, that *Andrena labialis* seems peculiarly attached to the London clay,) being naturally cold, attracts fewer Insects, excepting the widely-disseminated Harpali. In gravel, occur the genera Opatrum, Halictus, Cerceris, with numerous colonies of Ants. To a chalky soil are attached the Ophoni, Licini, Chætophora, and various species of Polyommata, *Osmia spinulosa*, and *Andrena hæmorrhoidalis*. When collecting in the mud of the fresh-water marsh, we capture Blethisa, Chlenius, Omaseus, and Agonum, and several Carabidæ. In the slime of brackish waters, several Notaphi are exceedingly abundant, though rare elsewhere; and in company with them we find the subaquatics Elopheorus, Parnus, and springing Salda. It has also been observed, that *Pimelia* is only to be met with where the plants of the genus *Salsola* abound. *Catascopus* and *Elaphrus* frequent the alluvium of rivers. In the mud of lakes and pools various genera of Eupodina, Nothophilus, Bembidiadæ, and Trechidæ occur; and in vegetable mould, where the grass is luxuriant, numerous Diptera, and Larvæ of Lepidoptera, abound. Even in this short and imperfect account of different genera attached to varieties of soil, sufficient has already been stated to prove that it exerts an important control over the range and distribution of Insect races: however, to give the naturalist a better insight into Indian groups, I shall here add an analysis of the leading families and genera which have fallen under my observation, and then conclude with an abstract describing the leading characters of Himalyan and Indian Entomology.

From what has already been written, it will appear that Insects, in their geographical distribution, are influenced by various causes; by temperature, by excess or deficiency of moisture, by the influence of vegetation, and by soil. There is yet, however, another, which materially affects, in some instances, particular groups, namely, the peculiarity of the organization of the Insects themselves. Should any genera of Insects occur which are deficient in the organs of locomotion, they would naturally be restricted to certain localities. How many genera of the Coleoptera and other orders are apterous, and are only found in particular situations; and they

have necessarily particular functions to perform in their restricted limits, and also particular organs adapted to the work assigned them by the Creator. It is to the study then of the differences of organization adapted to differences of situation, and other external circumstances wherever we find Insects, that the entomologist should direct his attention. Contemplating all these instances of adaptation, we reverence the wisdom of a creative and the beneficence of a superintending Providence, that prevents diminution and increase, both extremes of which would prove injurious; for without these "armies of the living God," to keep in check the fecundity of nature, plague and pestilence would walk abroad, and depopulate not a single country, or one quarter of the globe, but the whole earth itself. In concluding my observations on the geographical distribution of Insects, I think it may be stated, that naturalists on this subject have almost exclusively directed their attention to temperature. Where temperature fails, we may turn to vegetation; and if the latter is not sufficient, then to the soil and strata of a country, and even to the organization of the Insects themselves, as well as other causes. No one by itself is sufficient to unravel the difficulties which arise; by uniting all, however, we may in a great measure account for the various discrepancies that occur.

In connexion with the foregoing, the following *Desiderata in the Entomology of India*, by the Rev. F. W. HOPE, are republished from the *Calcutta Journal of Natural History*. No. 1.

1.—Parasites of Birds, Lice, (*Nirmî*). Parasites of *Reptilia* (*Acari*) the name of the genus and species should be given on which they are found. Parasites of Quadrupeds, Ticks, &c.

2.—Endeavour to ascertain if the larger Beetles of India live more than one year; it is important also to ascertain the sexes of the *Atlas Beetles*, and the uses to which their horns are applied.

3.—Ascertain the names of the trees which yield *Resin Anime*; and if any other resins in India contain insects.

4.—Among *Coleoptera*, attend chiefly to the *Lamellicorn Beetles*, *Cetonia*, *Copris*, *Scarabæus*, and *Euprestidæ*.

5.—Ascertain by dissection of gigantic *Coleoptera* if the organs of hearing are in the basis of the antennæ as in *Crustacea*; collect the larvæ of all large *Beetles*, and try if they have the power of hearing.

6.—Send me an account of the habits of *Pausus*, and all the species you can obtain.

7.—Any species of insects infested with worms should be noticed. The worms should have drawings made of them before put into spirits.

8.—All hermaphrodite insects to be noticed, as well as irregular copulation of different genera.

9.—All *Carrion Beetles* to be attended to. They are supposed to be scarce in India. The

prejudice of caste and of religion will not allow many of the natives to touch a dead body of any animal.

10.—All species of silk-bearing insects used in commerce, with their local names and larva, eggs, &c. It is probable we may breed the Atlas Moths in England. Send Larvæ of any, placed in mould, when an opportunity occurs. Colonel Withill introduced alive into England *Bombyx Selene*. Any reports of the annual produce of silk useful.

11.—*Cochineal*. new species; intelligence wanted about its range. How many species in commerce in India. *Lac insect* also.

12.—*Bees*. All species of Bees to be collected. Any accounts of the produce of honey. The *Native names* of Bees much wanted; any thing remarkable in the combs to be figured. All *parasite beetles* found in Bees' nests much wanted. Imports and exports of honey and wax. What are the Bees which produce the wax of the Chinese candles? there are several sorts.

13.—*Ants*. Collect all species of Ants—males, females, and neuters. Ascertain if they *lay up* stores of grain, seeds, &c.; be careful in marking the species. What Ants will drive out the White-Ants? Are the different kinds employed by the natives, to drive out those which annoy them? Experiment on the formic acid. If the White-Ants' nests are ever used as ovens.

14.—*White-Ants*. Collect all species; attend to their parasites, particularly the *Beetles*, which attack them, and are found in their nests.

15.—What insects are eaten as food? Their Indian names. What *Locusts* are eaten, &c.?

16.—Mark those insects which cause any particular destruction of crops, and if the destruction is periodical.

17.—Mark all *luminous* insects. Ascertain if the *Lantern Fly* is *luminous*: it is disputed.

18.—What species of *Mygale* are in India? Their habits. What spiders yield silks, such as are found in commerce?

19.—What species of vesicatory insects are used in India? If any besides *Lytta* and *Mylabris*. If any insects are used medicinally. Their names.

20.—Record any instance of death occasioned by insects, by Bees, Wasps, Hornets, or by Flyblowing, &c. Any ailments produced by insects swallowed in the larva state, &c.

21.—Is *Resine Anime* a preservative against the attacks of insects? Said to be used in corking bottles. Is cloth coloured by *Indigo* ever attacked by the White-Ants and other insects?

22.—Any native remedies against Cockroaches? Collect all species of, and particularly all sorts of *Earwigs*.

23.—Native remedies used after the stings of insects, and the attacks of Gnats, Scorpions, Centipedes, &c.

24.—Note all insects infesting houses. Does any true *Plinius* occur in the East Indies?

25.—Species of *Astrus* attacking quadrupeds; collect them. Do any attack man in the East?

26.—Collect all Aquatic Beetles. Do the *Cyrene* of India emit a peculiar smell? Do the *Carabei* emit an ammoniacal odour?

27.—Collect all Land-Crabs and inland *Crustacea*.

28.—Observe particularly the insects which destroy corn, rice, and all stores. What checks are in use?

29.—Note any extraordinary migration of Caterpillars, and indeed of all other insects.

30.—The *Mole Cricket* of the East Indies. What are its habits?

31.—Note the appearance of the clouds of Locusts.

32.—What are the preservatives used by the Indians in guarding their feathers and shawls? *Colocynth* supposed to be used.

33.—What genera and species of insects are used by the natives, in necklaces and ornaments, &c.?

34.—The habits of the large *Stag Beetles*. Do they destroy leaves?

35.—Note all odorous smelling insects.

36.—Are Beehives in use in India? Send specimens of domestic Bees, if they are domesticated.

37.—Is the *Sherifah*, or Custard-Apple seed, injurious to vermin? Flies are reported never to settle on the tree or its fruits. Ants will attack both.

38.—From what quarters do clouds of Locusts come?—*Madras Lit. Soc. Jour.* quoting "The Entomology of the Himalayas and of India, has been noticed by the Rev. F. W. Hope, F.R.S., F.L.S., &c., President of the Entomological Society of London. (Dr. Royle apologized to the Rev. Mr. Hope and to his readers for the long delay which had occurred in the publishing of this valuable Paper, written for him in 1834, and which had been in type for a considerable time. The Insects of this Author's collection which Mr. Hope described, were collected in the neighbourhood of Saharunpore, in the valleys of the Himalayas, and on the mountains in the neighbourhood of Mussooree, at 6,500 feet of an elevation in 30° of N. latitude, many of the desiderata required by Mr. H. on temperature and vegetation, are detailed throughout Dr. Royle's "Illustrations," and there is a remarkable coincidence in opinion, respecting the distribution of Insects as given by Mr. Hope, with that of Dr. Royle on the geographical distribution of the Flora of the plains and mountains of India.—J. F. R.)

It may by some be considered, he remarks, a proof of presumption, that any individual should undertake to describe the entomo-geographical character of a country which he has never visited; and bold, I am willing to allow, is the attempt to embrace, in my views, not only the



tribution of Insects in the Himalayas, but those also of the whole Continent of India and its adjacent islands. Possessing, however, one of the richest Cabinets of Oriental Entomology to be found in this or any other country, the major part of the species collected at Calcutta, Madras, Poona, and Singapore, and in the islands of Java and Ceylon; and through the kindness of my friends, the late lamented General Hardwicke, Colonels Sykes and Whitehill, Captains Law, Smee, and Smith, having access to their rich and extensive collections from Nepal, Bombay, and the Deccan; I may be enabled, perhaps, from such a mass of materials, to offer some new facts respecting the geographical distribution of Insects, a subject apparently little studied, and certainly not sufficiently appreciated. It is, indeed, with diffidence that I undertake a task beset on all sides with difficulties; and before I enter on it, I claim the indulgence of my readers, and solicit them to regard the present attempt merely as an outline sketch, which can afterwards be filled up with greater accuracy, as our acquaintance with the nature of the soil, and the forms of animal and vegetable life belonging to the East, become better known.

*Analysis.*—Of the Entomology of the Himalayas and of India.

*Cicindelidæ.*—The following genera belonging to this family are not uncommon in India, viz. *Therates*, *Tricondyla*, and *Colliuris*: the two former are characteristic of a southern range, while the latter is abundant throughout the eastern continent. Of Indian *Cicindelidæ*, more than sixty species have fallen under my notice: the most splendid of the race abound in Nepal. Among various species, however, peculiar to the Himalayas, only one approaches the form of our European *Germanica*.

*Dryptidæ.*—As I am only acquainted with a single species of Indian *Casnonia*, I pass on to *Drypta*, a Nepalese individual of this family belonging to the genus *Desera*, Leach, which is described in General Hardwicke's collection. Five others are also recorded as inhabiting India.

*Lebiadæ.*—*Cymindis* has not yet been discovered in India; eventually it may occur in the Himalayas: it is difficult to imagine what genus takes its place. *Lebia* is of rare occurrence in the East; a nondescript, named *unicolor*, in my collection, is from the Himalayas. *Aploa* is found at Poona. *Orthogonius* is common to Africa and Asia: the gigantic species, however, predominate in the latter country.

*Brachinidæ.*—The French writers appear unacquainted with the true type of *Helluo*, exclusively belonging to New Holland: the genus denominated *Omphra* by Dr. Leach, applies solely to the Indian *Helluones*. *Ozaena* and *Pseudo-zaena* inhabit Calcutta and Cayenne; while *Trigonodactyla* appears in Africa and Asia. The *Graphipteræ* of the sandy deserts have no

representative in the East. This genus appears to unite *Brachinus* and *Anthia*: the latter is found throughout the continent of India. Some of the specimens from Nepal, however, are very diminutive. *Aptinus* is partly confined to Northern Europe and America; while true *Brachinus* enjoys the unlimited range of the world. *Catascopus* is found in Nepal, and resembles in its habits *Elaphrus* of Europe, and probably occupies its place. *Dyscolus*, *Promecoptera*, and *Thyreopterus*, prefer the southern tropical regions, and are not found to range as far north as the Himalayas.—*Hope, M. L. J. July 1840, p. 115.*

*Scaritidæ.*—*Siagona atrata* is met with in Nepal and various parts of India: a specimen lately received from Egypt, if not the self-same, is so exceedingly alike in size and sculpture, that it is very difficult to distinguish. The *Scaritidæ* abound in both hemispheres. *Scapterus* of India is represented by *Oxystomus* in the Brazils, and in Africa by *Acanthoscelis*. *Morio* and *Clivina* will, perhaps, be found in both the Old and New World; the latter, indeed, is common to all temperatures; the former may eventually occur in Europe, perhaps in Sicily.—*Hope, M. L. J. July 1840, p. 115.*

*Harpalidæ.*—*Harpali* are found dispersed nearly in all the countries of the globe: they abound more in the arctic than antartic regions. The following genera are recorded as belonging to India, viz. *Harpalus*, *Platymetopus*, *Selenophorus*, *Cyclosomus*, and many others. Some species of *Ophonus* from Bengal and Poona, closely resemble British species.—*Hope, M. L. J. July 1840, p. 115.*

*Pogonidæ.*—Some of the genera of this family are not confined to the temperate zones; the major part of them prefer the polar regions. *Pogonus* and *Cardiaderus* are met with in Asia and Africa; while *Patrobus* is apparently peculiar to Northern Europe and America.—*Hope, M. L. J. July 1840, p. 115.*

*Calathidæ.*—*Dolichus* has not yet been discovered in India: it is probable, however, that it will occur there. *Pristonychus* inhabits Nepal and Europe; while *Calathus* prefers a northern more than a southern climate.—*Hope, M. L. J. July 1840, p. 116.*

*Feroniadæ.*—Instead of finding *Pœcilus* in India we meet with *Trigonotoma*, *Catadromus*, *Lesticus*, and *Distrigus*: most of them peculiar to that continent. *Argutor antiqua* occurs in the East; *Omasus* and *Platysma* in Nepal; and *Steropus* in the vicinity of Poona. It is by mistake that *Percus* has been introduced among oriental genera. *Cephalotes* is found in Nepal and Australia; *Stomis*, *Zabrus*, and *Pelorus* prefer the temperature of Southern Europe. They may, however, be expected to appear in the Himalayas. *Amara* is captured in Japan; *Antaretia* and *Masoreus* are equally natives of

Europe, Africa and Asia. Several nondescript species from the East of the latter genus, are to be found in our English cabinets.—*Hope, M. L. J. July 1840, p. 116.*

*Sphodrindæ*.—The genus *Sphodrus* occurs in Nepal, and the anomalous form of *Mormolyce* in Java and Singapore; which last has been ranged with this family, but appears to be sadly out of place, as it is most likely a subcortical feeder.—*Hope, M. L. J. July 1840, p. 116.*

*Anchomenidæ*.—I am not aware that *Platynus*, *Agonum*, or *Olistophus*, have yet been discovered in India: the two former will no doubt be found in the Himalayas, when the Insects of that country are better known.—*Hope, M. L. J. July 1840, p. 116.*

*Callistidæ*.—*Eponis* and *Chelanius* abound in the tropics: the maculated set appear common to Asia and Africa, each country possessing species almost exact representatives of each other. *Chelanius nepalensis* approaches in form to *Licinus*; and although *Oodes* is widely dispersed over India, no Nepalese examples have yet come under my notice. *Callistus* occurs in the Mysore.—*Hope, M. L. J. July 1840, p. 116.*

*Dicelidæ*.—*Rembus* is found on the Malabar and Coromandel coasts, at Calcutta, and in Nepal: its allied genus, *Licinus*, may be expected to occur, as some Asiatic species have already been described. *Panagæus* has its metropolis in India.—*Hope, M. L. J. July 1840, p. 115.*

*Proceridæ*.—Among the Insects collected by Dr. Wallich, there were four or five species of true *Carabus*, only one of which I was enabled to describe. Several may occur in the colder mountain temperature, and it is probable they will resemble Siberian forms. Wherever the oak grows, there *Calosoma* will be found. Seven eastern species are known to me. *C. indicum* inhabits Nepal. If caterpillars are necessary to keep in check the luxuriance of tropical vegetation, surely the *Calosomata* are equally necessary to keep within bounds these Insects, which sometimes destroy, in northern climes, nearly the foliage of the year.—*Hope, M. L. J. July 1840, p. 117.*

*Nebriidæ*.—This family may be considered as belonging to a Northern and Alpine range. Should it occur in Nepal, it will be found at a considerable elevation, possibly amid the Himalayan snows. As to *Elaphrus*, I have already stated an opinion that *Catascopus* represents it in India.—*Hope, M. L. J. July 1840, p. 117.*

*Bembidiidæ and Trichidæ*.—Of the former family, several genera will no doubt eventually be found in Nepal: a single species of *Tachys* is the only example I am able to record at present. Of the latter, *Stenolophus*, *Acupalpus* and *Tetragonoderus* have occurred: the last of which may take the place of *Bembidium*.—*Hope, M. L. J. July 1840, p. 117.*

*Dyticidæ*.—Aquatic *Colcontera* are apparently

not much influenced by climate: the temperature of water not varying like that of the earth or air, is the reason we meet with the self-same species in the interior of India and the south of France. *Dytiscus* appears confined to Northern Europe or America, while *Cybister* is dispersed throughout the world. *Eunectes* and *Hydaites* belong to Nepal and India, and to the latter country we may add also the following genera, viz. *Colymbetes*, *Laccophilus*, *Noterus*, *Hyphydrus* and *Hydroporus*.—*Hope, M. L. J. July 1840, p. 117.*

*Gyrinidæ*.—Many gigantic species of *Gyrinidæ* abound in India. *Dineutus nepalensis*, *politus*, and *spinosus*, have been found within the Himalayan districts.—*Hope, M. L. J. July 1840, p. 117.*

*Hydrophilidæ*.—Several genera of this family are as widely distributed as the *Dyticidæ*; and most of those found in India inhabit Nepal.—*Hope, M. L. J. July 1840, p. 117.*

*Necrophagæ*.—Differing with most entomologists, I am inclined to believe that the carrion feeders abound more in warm countries than is generally believed. The religious prejudices of the Indians not allowing them to touch a dead body, may account for the few species which have hitherto reached Europe from the East. *Necrophorus*, *Necrodes*, *Silpha*, and *Oiceoptoma*, are met with in India and Nepal. It is probable that *Necrophorus* is more peculiarly adapted to Northern climates, while the remaining genera affect those of tropical regions.—*Hope, M. L. J. July 1840, p. 118.*

*Erotylidæ*.—Passing *Nitidulidæ*, which have been captured in India, we arrive at *Eugidæ* and *Erotylidæ*. In the former family, we find *Triplax*, *Ips*, and *Dacne*; in the latter, *Erotylus*; and next to this group, *Languria* and *Eumorphus* should be placed; genera abounding in species in Nepal and India.—*Hope, M. L. J. July 1840, p. 118.*

*Dermestidæ*.—In General Hardwicke's collection, there is a Nepalese specimen of *Dermestes*, similar in every respect to *D. lardarius* of Europe: a second species is closely allied to *D. vulpinus* of Africa. It is scarcely possible that either of them can have been imported into the Himalayas by commerce. This genus, and its congeners, is apparently a predominant group throughout the world.—*Hope, M. L. J. July 1840, p. 118.*

*Byrrhidæ*.—The foreign *Helocerata* require attentive examination. Among the drawings of the Nepal collection, made purposely for General Hardwicke, two species of *Anthrenus* are figured; they appear novel in form.—*Hope, M. L. J. July 1840, p. 118.*

*Histeridæ*.—This family abounds in India. I am acquainted with more than fifty species from the East: some of the Nepalese specimens are in too mutilated a state to describe.—*Hope, M. L. J. July 1840, p. 118.*



*Lucanidæ*.—I formerly described six species from Nepal: two more from the Himalayas are undescribed in Dr. Royle's collection. In no country is there a greater admixture of temperate and tropical forms than in India; some of the Lucanidæ resemble our British species very closely, while others are the same as those in Java and Singapore. Forty species have been submitted to my inspection. Passalidæ are not equally abundant in the Old as in the New World.—*Hope, M. L. J. July 1840, p. 118.*

*Lamellicornes*.—The celebrated *Ateuchus Ægyptiorum*, or Sacred Beetle, has almost an exact representative in India. *Gymnopleurus capicola*, Hope, and *azureus*, Jab. both of them African species, are replaced in the East by *G. sinuatus*, Jab. and *splendens*, Hope. *Sisyphus* is met with in both hemispheres. *Epirinus* is an African, as well as an oriental form. Several Indian Copridæ resemble those of Egypt. *Copris Midas* of India and Nepal, exactly corresponds with *C. Isidis* of Africa. *C. Sabæus* and *Pithecius* appear common to both continents, and are equally abundant in Ceylon; and several smaller species of *Copris*, from the eastern part of Africa, if not the same, approach so closely to those of Western Asia, as to induce a belief that they are the same Insects, only modified by climate. *Onitis* and *Oniticellus* have also several representatives in both regions, if not in some instances the self-same species. *Onthophagus* abounds more in India than any other country; some of them unrivalled in size, splendour, and variety of form. More than 120 oriental species may be seen in European cabinets; five only now are described from Nepal; double that number, however, are in too mutilated a state to be characterized. *Pactolus* of Nepal and India, is represented in Senegal by *Harpax*, Jab. *Aphodius*, compared with *Onthophagus*, as an Indian group, is quite insignificant; scarcely twenty species are recorded, including those of Manilla and the Eastern Isles: a nondescript from Nepal will appear in the Appendix. There was only a single specimen of *Trox* in General Hardwicke's collection.—*Hope, M. L. J. July 1840, p. 119.*

*Geotrupidæ*.—*Geotrupes* has been denied by Latraille to exist in India; the Baron de Jean also makes no mention of any Eastern species from that country in his last catalogue. Two species are in my recollection; one from Delhi, and a second from Japan; a third also, unique, is among Dr. Royle's Insects from the Himalayas. It is probable that this genus, when found in India, appears on mountains at a considerable elevation: the species also may be the common food of the Shrikes of that country, as they are in Europe, should those birds be found there. *Orphnus*, *Athyreus*, and *Hybosorus*, occur in India. *Bolboceas* appears in some measure to supply the place of *Geotrupes*, which last is not

so important a group in the East, as in a northern region.—*Hope, M. L. J. July 1840, p. 119.*

*Scarabæus*.—Under this term, the gigantic and most remarkable Insects of the Old World are ranged. Four species, allied to *S. Atlas*, Jab. are indigenous to Nepal, a convincing proof that equatorial forms extend beyond the tropics, and that they are found in much colder temperature than is generally believed. There are several genera of *Scarabæidæ*, besides *Oryctes*, found on the Himalayas as yet uncharacterized; some of them approaching African types.—*Hope, M. L. J. July 1840, p. 120.*

*Melolonthidæ*.—Some of the *Melolonthæ* of Nepal are closely allied to the British *M. vulgaris*; others again, with the margins of the thorax serrated, evince their affinity to tropical species. *Geniates*, *Apogonia*, &c. are common to the Himalayas, the whole continent of India, and the Southern Isles.—*Hope, M. L. J. July 1840, p. 120.*

*Mimelæ and Euchlora*.—These genera appear peculiar to the East: in a monograph, read before the Entomological Society, there are thirteen *Mimelæ* described; several from Nepal. *Euchlora* appears wherever *Mimela* ranges, and is more abundant in species.—*Hope, M. L. J. July 1840, p. 120.*

*Popillia*.—This genus appears nearly equally abundant in Asia and Africa, and is common to the Old and New World. Fourteen species have been collected in Nepal. The following genera of *Melolonthidæ*, also, *viz.* *Anomala*, *Hoplia*, *Apogonia*, and *Adoretus*, occur in the same territories.—*Hope, M. L. J. July 1840, p. 120.*

*Trichiidæ*.—*Acanthurus*, *Trichius*, and *Dicro-nosephalus*, inhabit the Himalayas. The first of these forms approaches our European type, the latter is the representative in India of what *Goliathus* is in Africa, and *Incas* in Southern America. *Goliathidæ* is a conspicuous family, and may justly be ranked among the most extraordinary forms of the Insect world.—*Hope, M. L. J. July 1840, p. 120.*

*Cetoniadæ*.—Although I described seventeen species from Nepal, Dr. Royle's collection appears to contain at least six more, entirely new. *Campsiura xanthorhina*, Hope, is represented in Africa by *Cetonia scutellata*, Jab. *C. cornuta*, Jab. is found in Africa, as well as Asia. I am acquainted with more than 111 species from India, and from this surprising number still likely to be greatly increased, it is evident that the metropolis of *Cetoniadæ* is situated in the tropical regions.—*Hope, M. L. J. July 1840, p. 120.*

*Buprestidæ*.—Of this superb and extensive family, comprising at present more than one thousand species, existing in the cabinets of Europe, the most magnificent inhabit India; the splendid *Sternocera* and giant *Catoxantha* range the Equator and the tropics. Ninety species belong to the continent of India, many

to Nepal, the isles of Java and Sumatra: among them are forms of temperate as well as of northern climes.—*Hope, M. L. J. July 1840, p. 121.*

*Elatridæ*.—This family presents us with types of form belonging both to the tropical and temperate regions: the former, however, are few in number, when compared with the latter. Several of the Nepalese *Elatridæ* resemble British species, some so closely as to induce one to imagine that difference of climate is the cause of variety of the species. *Elater murinus*, Fab. of England, is well represented in Nepal by *Elater cœnosus*, Hope; and various species, which in Europe frequent the oak, alder, and willow, have Nepalese species nearly resembling them, and we have stated that there is a correspondence of vegetation between Europe and the Himalayas.—*Hope, M. L. J. July 1840, p. 121.*

*Lampyridæ*.—Passing the *Cebionidæ*, few examples of which occur in India, we arrive at the *Lampyridæ*; and justly may the East boast of its numerous and fine species, unsurpassed probably by those of South America. The warm damp of the jungle is peculiarly adapted to the habits of this family. *Lycus* and *Omalysus*, as well as *Lampyrus* abound in the Himalayan range.—*Hope, M. L. J. July 1840, p. 121.*

*Malacodermata*.—By some writers, the families composing this group are considered rare within the Tropics, and they certainly are more abundant in Nepal than Central India; and yet they are not of rare occurrence. *Anisotelus*, Hope, appears to be peculiar to the East. Several species of *Malachius* and *Melyris* enjoy an Asiatic and African clime.—*Hope, M. L. J. July 1840, p. 121.*

*Cleridæ*.—By the family *Cleridæ* abounding in the East, we arrive at the *Ptinidæ*; they, the latter probably, exist in Nepal; none, however, I believe, have yet been discovered in India, the nearest locality where they are found being the Mauritius. The *Bostrichidæ* are, however, abundant, and it is not unlikely that the *Paussidæ* commence where the *Ptinidæ* terminate.—*Hope, M. L. J. July 1840, p. 121.*

*Curculionidæ*.—Without entering at large into the geographical range of the numerous genera of this family, I briefly state, that Nepal contains many tropical forms, as well as others, which are peculiar to temperate climes, some of them extending from the Himalayas, even to New Holland, particularly *Sipalus*.—*Hope, M. L. J. July 1840, p. 122.*

*Prionidæ*.—By the *Cucujidæ* (common to India and Nepal) we arrive at the *Longicornes*. *Prionus* loves the torrid and tropical zones; some of the Himalayan species indicate an alliance to European types.—*Hope, M. R. J. July 1840, p. 122.*

*Lamiadæ*.—The largest, as well as the most beautiful species of this family, are found in Nepal. *Lamia Roylei*, Hope, is unrivalled in size;

and *L. Wallichii* surpasses all other in beauty and colouring; it is found in Nepal, Japan, at Singapore, and the Isle of Java. *Cerambyx*, *Callidium*, *Clytus*, and *Saperda*, are predominant groups, and are found in all countries and climates. Many Nepalese species exactly represent our European types.—*Hope, M. L. J. July 1840, p. 122.*

*Sagridæ*.—Omitting *Lepturidæ*, confined almost entirely to Northern Europe and America, we arrive at *Sagridæ*. *Donacia* occurs in Java, and we may expect to meet with it in Nepal, and other parts of India; if not, it is probable that *Sagra* takes the place which *Donacia* does in northern regions. Several species of this genus are found on the *Nympheacæ*. I am doubtful if *Sagra* attaches itself to peculiar water-plants, or frequents the same as the former genus. *Megalopus* is found in Nepal, in Africa, as well as South America. *Crioceris* also appears to be a predominant group, while *Adorium* is confined more to Asia than Africa.—*Hope, M. L. J. July 1840, p. 122.*

*Gallerucidæ*.—*Galleruca* and *Auchenia* abound in Nepal, *Halticæ* are found throughout the world, and are intended probably to keep in check particular vegetation. In Europe, the genera *Brassica* and *Sinapis* almost annually suffer from their depredations; they appear to abound more in light and sandy soils; and where lime is used instead of animal manure, the crops are less attacked.—*Hope, M. L. J. July 1840, p. 122.*

*Chrysomelidæ*.—Many of the Nepalese species resemble those of Siberia; others approximate closely to European forms, so much so, that in many instances they appear like one and the self-same insect; and if not the same, they are certainly similar representatives of their respective countries, and probably fulfil the same offices and functions. *Podontia* and *Phyllocharris* seem peculiar to Asia and New Holland.—*Hope, M. L. J. July 1840, p. 123.*

*Eumolpidæ*.—The *Eumolpidæ* of India are not surpassed in beauty or splendour by those of South America: they seldom, however, equal the latter in size. *Clythra* and *Cryptocephalus* occur in the East, both of them abounding more in temperate than tropical countries; in Dr. Royle's collection there were found several undescribed species from the Himalayas.—*Hope, M. L. J. July 1840, p. 123.*

*Cassididæ*.—About fifty species of Indian *Cassida* have come under notice; some of the Nepalese species resemble English specimens, and may be parasitic on the thistle, as they are with us.—*Hope, M. L. J. July 1840, p. 123.*

*Coccinellidæ*.—Although I described twenty new species from General Hardwicke's collection of Nepal Insects, I find five others undescribed in Dr. Royle's collection from the Himalayas. *Coccinella 7-punctata*, Fab. appears common to Eu-



rope and Asia; at least the specimens agree so exactly in every respect, that after a very accurate examination, no important difference can be found; and believing them to be the same, I still cannot imagine that they have been imported into India by commerce. *Endomychus* may eventually be expected to occur in Nepal.—*Hope, M. L. J. July 1840, p. 123.*

*Hispidæ*.—*Hispa erinacea* is abundant in Nepal; and two undescribed species are in Dr. Royle's collection from the same country.—*Hope, M. L. J. July 1840, p. 123.*

*Tenebrionidæ*.—The transition from *Hispidæ* to the present family by means of *Sarrotrium* is rendered easy. *Hegeter* and *Tagenia*, common to India, appear to follow in successive order. Both *Upis* and *Tenebris* are found in the Himalayas, and are abundant in the Tropics.—*Hope, M. L. J. July 1840, p. 123.*

*Pimeliariæ*.—*Pimelia* has not yet been described as existing in India; last year I received two species from the vicinity of Poona. *Sepidium*, *Blaps*, *Eurynotus*, and *Opatrum*, occur in the East; the first prefers the Southern Tropic; the two next appear at Bombay, Calcutta, and Nepal; and the last is widely dispersed throughout the East. Passing *Diaperidæ* and *Cossyphus*, both of them common to Asia and Africa, we next meet with *Cistela* and *Lagria*: the latter apparently a predominant group. *Pyrochroa*, also has been discovered in Java.—*Hope, M. L. J. July 1840, p. 124.*

*Helopidæ*.—This family is the grand receptacle for the various forms of the *Heteromera*. Among the Indian genera we find *Amarygmus*, *Onodulon*, and *Platycrepis*, with several true *Helopidæ*, rivalling in splendour and magnitude those of the South American Continent.—*Hope, M. L. J. July 1840, p. 124.*

*Mordellidæ*.—Most of these Insects are parasites of the *Hymenoptera*, and abound in tropical climates. Their office is probably to keep in check, and prevent the too rapid increase of *Vespidæ* and *Bombidæ*: they are common to the Old and New World.—*Hope, M. L. J. July 1840, p. 124.*

*Cantharidæ*.—The geographical distribution of this family is particularly interesting, as it contains those Insects which are used in Medicine, and denominated Blister Flies. *Lytta gigas*, Fab., is found abundantly in India, and also in Senegal; and there is little doubt that several species of *Mylabris* will be found common to both continents. These vesicatory Insects of the Old World are replaced in the New by the genus *Tetraonyx*.—*Hope, M. L. J. July 1840, p. 124.*

*Staphilinidæ*.—By the families *Notoxidæ* and *Scydmænidæ*, we arrive at the *Pselaphidæ*, and afterwards at the *Brachelytra*, which terminate the *Coleoptera*. *Anthilephila* and *Notoxus* occur in Nepal, and *Scydmænus* in Java; while various other genera of *Staphilinidæ*

are widely dispersed throughout the East.—*Hope, M. L. J. July 1840, p. 124.*

*On the remaining orders*—Having entered fully into the consideration of Eastern *Coleoptera*, it is not my intention at present to go into lengthened details of the remaining Orders. It is sufficient to state, that in all of them there will be found similar and corresponding characters as in the *Coleoptera*. With regard to identity of species, I cannot help remarking, that of *Lepidoptera*, there appear to be a much greater number of species, widely disseminated throughout the world, than of any other Order. In Asia and Europe we meet with *Papilio Machaon*, *Gonepteryx Rhamni*; with some species of *Colias* and *Pontia*, with *Vanessa Atalanta*, and *Cynthia Cardui*; and to these might be added, several identical *Sphingidæ*, particularly *Acherontia*, *Atropos*, *Deilephila*, *Celerio*, and *Sphinx*. Among the *Noctuidæ*, *Geometridæ*, *Totricidæ*, and *Tineidæ*, many species will also be found inhabitants of both continents. In the *Orthoptera*, some *Gryllidæ* are common to countries remotely situated, which may partly be accounted for by the migratory habits of these Insects; and the same remarks may be applied to the *Sphingidæ*. Among the *Blattidæ*, several tropical species range widely; some of them have become naturalized even in a northern climate; and it is no uncommon occurrence to find Indian, Brazilian, and New Holland, species in a high state of perfection alive in the houses of London; and among the Eastern *Neuroptera*, there occur various *Libellulinæ* and *Hemerobidæ*, closely resembling English species.

Among the *Hymenoptera*, may be noticed the universal ranger, *Evania appendigaster*, ever attendant on *Blatta*; some *Ichneumonidæ*, *Crabronidæ*, *Apidæ*, and *Vespidæ*, all of them presenting identical species with those of Great Britain. In referring to the *Diptera*, I need only mention the wide range of the Orange Fly, the same in England, India, and America; the Gnats and Mosquitoes, common to the four quarters of the globe, alike the pest of the Indian and Laplander; and, lastly, various species of *Musca*, as widely dispersed as the half-domesticated sparrow of Great Britain. Passing by the *Aptera*, and the various parasites of birds, quadrupeds, and of man himself, we shall find also among the *Hemiptera*, several identical species of *Pentatoma*, *Reduvius*, *Tetyra*, besides *Cimex lectularius*, the scourge of all countries and climates. It does appear, then, from the above Analysis, that Asia and Europe have many Insects in common, and probably other parts of the world will eventually be found to present not only similar genera and representatives, but also the same identical species, subject to the modifications of climate, and other external circumstances.—*Hope, M. L. J. July 1840, p. 125.*

*Character of Himalayan Entomology.*—The character of Himalayan Entomology is twofold, Asiatic and European; and the intermingling of forms of temperate and tropical climes is one of its most distinguishing peculiarities. In its valleys (probably influenced by the heat and moisture of the jungle) southern forms predominate over northern; and it is not unlikely, that to the uninterrupted belts of jungle stretching along the mountain ranges, we may partly trace several tropical phytivorous genera far beyond their apparent natural limits. Some carnivorous Insects are also found ranging far to the north in the Himalayas; an example of which is *Anthia 6-guttata*, a well-known native of the tropics: the specimens, however, are mere dwarfs, compared with those of Peninsular India, a fact which may be regarded as a proof, that *Anthia* has here reached its extreme limits, and consequently will soon disappear (as is the case) and be represented by another type, fulfilling the same functions, only under a difference of form. The following genera of Himalayan Insects, selected from many others, will evince their tropical relationship. Among the Cicindelidæ, *Colliuris* appears; among the Carabidæ, we find *Desera*, *Omphra*, and *Cyclosomus*; among the Lamellicornes, *Eucolora*, *Mimela*, and *Dicronocephalus*; and to these may be added, *Anisotelus* belonging to Telephoridæ, and *Podontia* and *Phyllocharis* to the Chrysomelidæ: all of them attached to warm countries, and some, indeed, are seldom found but within the Torrid Zone. It is needless to state many genera from the Himalayas evincing an affinity to European types; I may here add, that various Himalayan genera closely approximate Siberian forms, and that some of the species described by Dr. Gebler from the Altaic chain of mountains, particularly some Chrysomelidæ, I believe to be indigenous in both regions, some few, however, are worth noticing, such as *Broschus* and true *Carabus*, *Geotrupes* and *Pimelia*: the two last have been declared by high authority never to be found in India. Regarding identity of Insects occurring in the Himalayas, as well as in Europe, there are several species of the following genera of Coleoptera, namely, *Elatér*, *Melolontha*, *Chrysomela*, *Cassida*, and *Coccinella*, which I cannot help thinking are the same as those of England; particularly as the vegetation of the two countries greatly coincide, for in very many cases, genera, and in some instances the self-same species of plants have been recognized. Among the carnivorous Insects, I believe that *Dermestes lardarius*, and *vulpinus*, *Corynetes violaceus*, and *rufipes*, and some of the Staphilinidæ, are essentially the same in Europe and the Himalayas. Of Lepidoptera, I figure *Papilio Machaon*, because it is evidently the same as what we meet with in England; the same remark will apply to *Vanessa Atalanta*,

and *Cynthia Cardui*. The French entomologists are inclined to regard the Insects of widely separated countries as distinct species; I wish to esteem them as varieties, and I cannot help thinking, that as identity of Plants has been satisfactorily proved by Dr. Boyle, so also we may believe in the identity of Insects in regions widely removed from each other. At any rate, should these varieties eventually prove distinct (which may be ascertained, I think, in the Lepidoptera order, when we become better acquainted with the oval, larval, and chrysalidous stages), yet the differences will ever be so slight, that we cannot separate or distinguish them in the imago state with any degree of certainty. But whether they be accounted species, or only varieties, we see the grand object of their creation, in their fitness for performing certain functions which are assigned them; one of these is, to keep in check the luxuriance of vegetation and to restrain it within due limits; another may be, that these puny agents may fecundate the flowers, by carrying the fertilizing pollen from tree to tree, and thus be the means, in one case, of promoting vegetation, as in another they are the agents of its destruction.—*Hope, M. L. J. July 1840, p. 127.*

*Entomological Character of India.*—From the foregoing Analysis, I have no hesitation in asserting that the pervading character of Indian Entomology is uniformity. It is true that we meet with numerous genera, both of tropical and temperate climes, associated together; the former more abundant, the latter less frequent (as we might naturally expect) than in the Himalayas. There is, however, a greater intermingling of forms than at first sight would be readily imagined; but when we take into our consideration, that many of the species resembling those of Europe may have been captured on the mountain ranges, at a considerable elevation, we may partly account for it. This attempted explanation, however, is not always available or satisfactory; for in the heated valleys of the East, we find many European types and species, in numbers sufficient to excite our astonishment. It will appear, then, that many species taken in temperate and northern climes, are not confined to them, and that the range they enjoy is very considerable, extending not only over the Old World, but also to the New. As we advance from the Poles to the Equator, vegetation is more luxuriant, in proportion as heat increases, and the quality of work assigned to the Insect races is proportionately increased. It is not natural to imagine that the functions performed by them in a colder climate, would in a warmer one require increased exertion and capabilities? It does not follow, because we find new types of form in tropical countries, and new genera of superior bulk and power, and more abundant in individuals, that therefore they necessarily replace the old ones, and are to perform



the duties peculiar to both regions; both may live and thrive together, and abound in the same countries, and will eventually be found to do so. When the genera of temperate climes appear within the Tropics, I see no reason why they may not have the same functions assigned them there, as in colder latitudes; but when we find new types of form, and a more powerful organization, with the size of the Insects greatly increased (as is the case in tropical regions), does it not almost naturally follow that they are intended solely for those regions, and for the increase of work they are there destined to perform? To return, however, to the subject of uniformity of entomological character throughout the Peninsula and the East, I think it probable that it is in a great measure to be accounted for by the general uniformity of its temperature, vegetation, and soil; there may, indeed, be other causes, which particularly influence it, but these may be esteemed the most essential. When we look to the range which genera here enjoy, it is very considerable: in part of the Himalayas, at the extreme southern points of India, in the West, and even in its Eastern Isles, there is one prevailing character, evincing every where the prevalence of tropical genera. To speak more specifically, in Nepal and the southernmost extremity of the Mysore, and in Ceylon, at Bombay, and at Madras, at Calcutta and Singapore, in Japan and Java, with the rest of the Polynesian Isles, the majority of the same types abound; and what is of more consequence, a great majority of the same species also occur in most of the above-mentioned regions. Having noticed the intermingling of genera belonging to Europe and Asia, we may probably find a slight accordance elsewhere. Now if we turn our eyes to Africa, we shall there find a considerable similarity in the entomology of this quarter of the globe with that of Asia; and this resemblance between the two countries will be readily seen by the short annexed list of some of the more particular genera, which are common to both of them. Among the Carabidæ occur *Anthia*, *Orthogonius*, *Trigonodactyla*, and *Siagona*. Among the Lamellicornes, *Epirinus* and *Popillia*, the conical Buprestidæ and the extraordinary Paussidæ, which last are chiefly found only in these regions; and to these may be added, as well as many more, the genera *Melyris*, *Megalopus*, *Sagra*, and *Adorium*; *Dorylus*, among the Hymenoptera, and *Diopsis* among the Diptera. Passing from genera to species, we shall find that precisely the same occur in both continents; among the most conspicuous, I shall mention but a few, namely, *Copris Midas*, *Sabæus*, and *Pithecus*, *Cetonia cornuta*, and *Lytta gigas*. Even supposing that no identical species occurred, which were common to Asia and Africa, yet we could not help observing the very remarkable similarity in the representa-

tives of each; one example of which is, *Ateuchus sanctus*, which very closely resembles the celebrated Sacred Beetle of the Egyptians, the object of their worship, by some regarded as an emblem of fertility, but I think more probably that of eternity. Before concluding my remarks on the similarity of Insects found in Asia and Africa, I cannot help expressing a wish that some individual may be induced to develop the character of the entomology of these gigantic regions more thoroughly than has yet been attempted; or there is an ample field for research and speculation. We shall feel much indebted to him, if he will explain how the Copridæ were transported from one country to another, and how they reached the island of Ceylon; how also *Cetonia cornuta*, which is taken on the banks of the Gambia, became an inhabitant of India. *Lytta gigas* may have travelled by land, and perhaps the Copridæ following the tracks and droppings of the camel, may have pursued the same route. Let him describe the sands of the desert and those in the vicinity of the Indus, give us a comparative Fauna of the Ganges and the Nile, record the varieties of temperature, the character of vegetation, and the genera peculiar to the different soils. Let him do this, following the steps of the celebrated Forskal, and he indeed will advance the objects of science, deserve the thanks of the present generation, and command the respect of posterity. By pursuing the course recommended by Mr. Hope, a naturalist would be enabled, not only to display the connection between soil, temperature, and vegetation, as well as the animal forms which the latter supports, but also prove the advantages of studying the natural sciences in connection with each other, and be enabled to explain something of the laws which influence the geographical distribution of plants and animals.—J. F. R.—*Hope, M. L. J. July 1840, p. 129.*

*Descriptions of Insects, by J. O. WESTWOOD, Esq., F.L.S.*

## ORDER DERMAPTERA, LEACH.

### FAMILY FORFICULIDÆ.

#### FORFICULA MACROPYGA, Westw.

*Piceo-nigra, punctata, abdomine æneo submicante, marginibus thoracis, tegminibusque rufescentibus, forcipe (♂) longissimo valde curvato, et gracili; (♀) fere recto tenuissimo.*

*Long. Corp. (forcipe excluso) ♂ lin. 6 ♀ lin. 5.*

*Ad genus Forficulam (stricte sic dictum Servilleo) appertinet, statura fere Forficulæ auriculariæ et paullo robustior, caput nigrum punctatum, impressionibus duabus anticis inter oculos. Antennæ ♀ (♂ mutilatæ) 13-articulatæ graciles rufescentes, articulis basalibus obscurioribus. —Prothorax planus antice vix emarginatus, lateribus antice rectis, postice rotundatis, niger punctatus, margine tenui rufescenti; soveolis du-*

## ENTOMOLOGY.

abus rotundatis antice impressus.—*Tegmina* piceo-refescentia, punctata portio alarum detecta concolor. *Abdomen* nigro-piceum punctatum æneo submicans; segmento penultimo lateraliter et angulariter producto (♂) aut simplici (♀). Forceps (♂) niger valde elongatus, gracilis ad basin, valde externè curvatus, in medio, dentibus duobus parvis internis instructus, apice sursum et exterius producto, acuto (♀) elongatus multo gracilior, rufescens fere rectus et inermis.—*Westwood, M. L. J. July 1840, p. 130.*

### ORDER LEPIDOPTERA, LINN.

#### DIURNA. FAMILY PAPILIONIDÆ.

##### PAPILIO MACHAON, Linn.

This handsome butterfly, like *Vanessæ Antiopa*, and *Atalanta*, *Cynthia Cardui*, and some others, affords an instance of wide geographical range, (Messrs. Godart and Latreille, in the *Encyclopédie Méthodique* (vol. IX., Art. Papillon) state, that *Pap. Machaon* is found in Syria and Egypt.) rather than of representative structure, since the individual figured cannot be regarded as specifically distinct from the European specimens, which differ amongst themselves in various slight particulars, as the size of the dark bars, and spots, &c. It may, however, be noticed, that the specimen figured has the small oval black spot near the extremity of the anterior wings almost entirely isolated, the large basal black portion of the same wings is very strongly covered with yellow powder, whilst the black lunules of the posterior wings are not nearly so much powdered with blue bloom, as in the ordinary English specimens.—*Westwood, Hope, M. L. J. July 1840, p. 130.*

#### FAM. NYMPHALIDÆ.

##### PAPHIA PARAKEKTA, Horsfield. Lepidopt.

###### Javanica.

*Paph* alis anticis ad apicem acutis, posticis subcaudatis; anticis supra ad basin cæruleis, fascia obliqua lata fulva in medio, apiceque nigro; maculisque duabus parvis albis (una discoidali, altera apicali) ornatis; posticis cæruleis.

The preceding characters, drawn from the upper surface of the wings of this remarkable butterfly, will suffice for its determination until the publication of Dr. Horsfield's description. The under surface of the wings are, however, much more remarkable, bearing a most striking resemblance to a pale dried leaf; the deception being much increased by the form of the wings, when brought in contact by the insect, whilst sitting upon a flower in the sun-shine, the short caudal appendages giving rise to the idea of the stalk of the leaf, thus completing the delusion.—*Westwood, Hope, M. L. J. July 1840, p. 131.*

#### DIVISION? —? FAM. ZYGÆNIDÆ?

##### Genus CAMPYLOTES, Westw. ♀

Genus anomalum *Heleonæ* et *Anthonoyzæ* Sw. *Gymnanto* cæruleque *Guér*, affine, alæ oblongæ, subovales, integræ, nervis apicalibus valde curvatis, antiæ cellula discoidali clausa

## ENTOMOLOGY.

nervos duos postice emittens, quorum exterior trifurcatis, posticæ etiam cellula discoidali clausa, nervo recurrente intermedio bifurcato. Corpus parvum abdomine gracili, pone alas haud protenso. Caput parvum. Ocelli 2. Antennæ graciles biramosæ. Palpi brevissimi supra haud discernendi, maxillæ elongatæ spirales.

CAMPYLOTES HISTRIONICUS, Westw, *Æneus*, alis ad costam rufis—, interne flavo-lineatis, maculisque apicalibus albis.

Long. Corp. lin. 11; Expans. alar. unc. 3. Habitat in Nepalia. Hardwicke; in Montibus Himalayanis, Royle.

Corpus nigro æneum, palagris maculisque abdominalibus lateralibus flavis. Alæ antiæ æneæ, costa, fasciisque duabus discoidalibus rufis, fasciisque tribus internis per totam longitudinem alarum currentibus flavis; maculis 8 vel 9 (spatium inter nervos apicales occupantibus) albis. Alæ posticæ similiter coloratæ, at maculæ terminales flavo ornantur.

This remarkable insect appears to be the extreme type of a very numerous Indian group of Lepidoptera, to which belong the species named *Capys pectinicornis*, *Thallo*, and *Rhodope*. It is impossible to decide upon their real affinities, until we obtain a knowledge of the metamorphoses of some of the species.—*Westwood, M. L. J. July 1840, p. 131.*

### ORDER ORTHOPTERA. FAM. MANTIDÆ.

#### MANTIS Roylii. Hope, MSS.

### ORDER HYMENOPTERA. Section PUPIVORA.

#### FAM. CHALCIDIDÆ.

##### DIRRHINUS HIMALAYANUS, Westw.

Niger, pedibus 4 anterioribus, tarsisque posticis rufescentibus.

Capite obtuse bicornuto.

Habitat in Himalaya.

Long. corp. lin. 2. Exp. alar. lin. 3.

Caput nigrum punctatum, anticè obtusè bicornutum antennarum articulo primo nigro (articulis reliquis deteritis). Thorax fortiter punctatus; metathorace 4 lineato et ad latera, angulariter producto. Abdomen breve depressum thoracis latitudine. Pedes 4 anteriores rufescentes, 2 postici nigri, tarsi solummodo rufescentibus.

Obs. In hac specie partes oris valde elongatæ, labro oblongo-ovali ciliato, mandibulis inter se similibus, gracilibus, sub apice dente interno unico armatis.—*Westwood, M. L. J. July 1840, p. 132.*

### ORDER HETEROPTERA. Section LONGILABRES.

#### FAM. SCUTELLERIDÆ,

##### SCUTELLERA PULCHELLA, Hope, MSS.

Cæruleo-nigra vel-æneo, nitida prothoracis disco anticè, et margine postico æneo vel cupreo tincto, scutello aureo viridique intenti, fascia transversa basali, alteraque centrali obliqua, (in medio interrupta) et maculis tribus rotundatis (postice et in triangulum positis) cæruleo-nigris.



## ENTOMOLOGY.

Statura fere Scutelleræ mauræ at paullo minor, scutelloque abdomen omnino obtegenti. Scutelleræ Stockeri affinis at robustior. Antennæ articulis duobus basalibus brevibus equalibus 3tio. 2do. fere duplo longiori, ultimo omnium longissimo.

Long. corp. lin. 5. lat. lin. 3.—*Westwood, M. L. J. July 1840, p. 132.*

### FAM. PENTATOMIDÆ.

MEGARHYNCHUS TRANSVERSALIS, Westw.

Fusco-niger, capite acuté bicornuto angulisque anticis thoracis acuté antice productis, prothorace et scutello transverse striatis, parte coriacea hemelytrorum nigrâ, tenuissime punctata, membrana apicali albida, antennæ et pedes nigri.

Long. corp. lin.  $7\frac{1}{2}$ . lat. lin.  $3\frac{1}{2}$ .—*Westwood, M. L. J. July 1840, p. 132.*

ORDER HOMOPTERA. Section SALTATORIA.

### FAM. ACADIDÆ.

CICADA SULPHUREA, HOPE, MSS.

Nigra, capite thoraceque sulphureo maculatis, alarum dimidio basali sulphureo, parte anticarum sulphurea, fascia obliqua nigricanti divisa, apicibusque fuscescentibus.

Long. corp. unc.  $1\frac{1}{2}$ . Expans. alar. unc.  $3\frac{3}{4}$ .—*Westwood, M. L. J., July 1840, p. 132.*

Affinis Cicadæ maculatæ, Caput nigrum orbitu interno oculorum sulphureo; thorax niger maculis 8 sulphureis abdomen nigrum segmentorum marginibus pallidis. Alæ anticæ costâ sulphureâ, maculaque ovali maximi (plus quam dimidium basale alarum occupante) sulphurea fascia obliqua tenui nigra internè dentata divisa; apice fusco nervis nigris Alæ posticæ ad basin sulphureæ, ad apicem fuscæ nervis nigris; pedes nigri.—*Westwood, M. L. J. July 1840, p. 133.*

ORDER DIPTERA. Section PUPIFARA.

### FAM. HIPPOBOSCIDÆ.

HIPPOBOSCA MACULATA.

Thorace fusco, flavo variegato, scutello nigricanti, maculis tribus flavis, media majori, femoribus tribusque posticis ad apicem fuscis.

Hippobosca equina; "ex India orientali paullo major, thoraceque magis albo variegato, at vix distincta." *Fab. Syst. Anth. p. 338.*

Hippobosca maculata, Leach, "On the genera and species of Eproboscideous Insects." *Wernerian Trans. Vol. ii. p. 349.*

Long. corp. lin. 4. Expans. alar. lin.  $8\frac{1}{4}$ .

Caput flavum, oculis fulvis, linea longitudinali inter oculos fusca. Proboscis nigra Thorax fuscus, macula magna ad angulos anticos flavescenti in medio fusca; fascia parva centrali lunulisque duabus in medio conjunctis posticis flavescentibus, scutello nigricante maculis tribus flavis media majori. Abdomen fuscum, punctatum, marginibus rufescentibus. Pedes fulvescentes tarsis omnibus femoribus tribusque posticis ad apicem fuscis.—*Westwood, M. L. J. July 1840, p. 133.*

## ENTOMOLOGY.

### FAM. NYCTERIBIDÆ.

NYCTERIBIA ROYLII.

Obscure nigra pedibus fuscescentibus elongatis, vix compressis, coxis anticis brevibus, abdomine ovalo, conico, depresso, 5-articulato, apice subtruncato, stylis duobus incurvis subtus armato, capite compresso.

Long. corp. lin.  $1\frac{1}{3}$ .

Habitat in India Orientali.

Nyct. Roylei. Westw. in *Trans. Zool. Soc. 1, p. 290-5.*—*Westwood, M. L. J. July 1840 p. 133.*

### ORDER COLEOPTERA.

CETONIA ROYLII, Hope.

Long. lin. 12 lat. Lin. 6.

Nigro-viridis thorace flavo marginato elytris-que quatuor maculis flavis notatis. Clypeus quadratus. Antennæ nigræ. Caput quadratum punctatum. Thorax cupreis marginibus externis elevatis, lineaque flava utrinque externa, disco fortissime punctato. Scutellum magnum postice decitum. Elytra nigro-virescentia maculis quatuor flavis notata, binæ fere rotundatæ ad basin positæ, binæ aliæ reniformes ante apicem lacatæ. Corpus infra nigro-æneum segmentis abdominis utrinque aurantiis capillis obsitis pedibusque concoloribus.

In Mus. Dom. Royle; in montibus Himalayæ captus ceria.—*Westwood, M. L. J. July 1840, p. 134.*

GEOTRUPES ORIENTALIS.

Long. lin. 10. lat. lin.  $6\frac{1}{2}$ .

Violaceus thorace sparsim punctulato, elytris striatopunctatis, pedibus supra nigris, infra violaceis nitidis. Antennæ piceæ capitulo fuscanti, thorax violaceus longitudinali serie punctorum in medio positi, variis aliis sparsim dispositis. Elytra striato punctata striis quasi vermibus erosis. Corpus infra violaceum nitidum, femoribus posticis uni-spinosis, tibiis pilosis, tarsis chelis-que piceis.

This singular species approaches very closely to some of the British species, and is probably from a high elevation of the Himalayan mountains.

In Mus. Dom. Royle.—*Westwood, M. L. J. July 1840, p. 134.*

ONTHOPHAGUS PHANÆOIDES.

Long. lin.  $4\frac{1}{2}$ . lat. lin.  $2\frac{1}{4}$ .

Niger obscurus, clypeo cornu reflexo abrupte truncato, thorace phanæoformi, postice lateribus, in spinam obtusam productis, femoribus luteis. Antennæ piceæ capitulo fuscanti: clypeus hexagonus cornu reverso abrupte truncato, thorax fere quadratus; punctatissimus, punctulis erosis tuberculo antice, fossulaque postice in medio marginis impressa, angulis posticis in spinas productis. Scutellum parvum nitidum. Elytra striata. Corpus subtus atrum nitidum punctatum. Pedes femoribus luteis, tibiis tarsisque nigropiceis.

This singular Insect will, at some future period,

## ENTOMOLOGY.

form the type of a new genus : in form it unites the South American *Phanæus*, and the widely-disseminated genus *Onthophagus*.—*Westwood, M. L. J. July 1840, p. 134.*

**LUCANUS LUNIFER.**

Long. lin. 37. lat. lin. 10.

*Æneo-piceas, areolo tomento aspersus, mandibulis exsertis unidentatis, denticulisque minoribus instructis, apice bifurcatis. Clypeo deflexo lunifero, femoribus castaneis.*

Hab. in Montibus Himalayæ; in Mus. Dom. Royle.

This Insect appears to unite in itself the characters of the Asiatic and European species, the latter rather predominating over the former: it is one of the finest forms of the Himalayan Fauna.—*Westwood, M. L. J. July 1841, p. 135.*

**LAMIA WALLICHII.**

Long. lin. 16. lat. lin. 5.

*Viridisericeus, antennis penicillatis, elytris tribus fasciis nigris, binisque penicillis dosalibus ornatis. Antennæ corpore longiores et nigro-virides, primo articulo subpenicillato, tribus sequentibus atris, penicillis magnis pilorum barbatis, et reliquis pubescentibus, ultimo tamen pubescentia densiori tecto. Thorax viridis, spinosus. Elytra ornata tribus fasciis vix suturam attingentibus, una in medio elytrorum, secunda inter mediam et apicem, tertiaque binis penicillis dorsalibus interrupta. Corpus subtus nigro-virens, sanguinea pubescentia aspersum. Segmenta quatuor abdominis sanguineo colore fucata, ultimum omne autem viride et nitidum. Pedes viridi-pubescentes, femoribus macula rufa notatis tarsisque infra flavis.*

It is impossible to describe accurately the beauty of this Insect; the sericeous covering, in different lights, imitating the various tints of opal, while the dark fasciæ flash with the iridescence of Labrador felspar.—*Westwood, M. L. J. July 1840, p. 125.*

**PORUS, Hope.**

{**STENIDÆ, ML.**

{**LONGIPALPI, Lat.**

*Corpus oblongum fere parallelum subdepressum. Caput mediocre oculis magnis lateralibus. Antennæ crassæ articulis transversis. Mandibulæ acutæ dente interiori armatæ. Labrum transversum integrum ciliatum. Maxillæ elongatæ bilobatæ. Palpi maxillares longitudine mediocres articulo 3tio. longo clavato, ultimo minimo. Labium elongatum apice lanceolato, paraglossis lateralibus. Palpi labiales breves, articulo ultimo parvo conico. Thorax fere circularis. Abdomen elongatum marginatum. Pedes simplices. Tibiæ calcaribus binis armatæ. Tarsis articulis simplicibus.*

**PORUS OCHRACEUS.** Long. lin. 4. lat. lin.  $\frac{3}{4}$ .

*Elytris punctatis antennis fuscis, mandibulisque ad apicem nigris.*

Hab. in Montibus Himalayæ; in Mus. Dom. Royle.

## ENTOMOLOGY.

This genus somewhat approaches the European *Evræsthetus*.—*Westwood, M. L. J. July 1840, p. 135.*

**APHODIUS.**

**APHODIUS IRREGULARIS, Hope.**

Long. lin. 4. lat. lin. 2.

*Flavus thorace nigro, elytris subaurantiis, fascia media maculis quatuor nigris, pedibusque piceis. Antennæ piceocapitulo fusco. Caput angulis anticis oblique truncatis. Thorax niger nitidus punctatus, angulis anterioribus flavis. Elytra flava, seu subaurantia, fascia media irregulari nigra, binis maculis humeralibus binisque aliis fere ad apicem locatis concoloribus.*

Hab. in Montibus Himalayæ; in Mus. Dom. Royle.—*Westwood, M. L. J. July 1840, p. 136.*

**ANISOTELUS, Hope:**

**TELEPHORIDÆ.**

*Antennæ articulo Ino. crasso, reliquis multo crassiori, 9-10 obconices magnitudine paululum crescentibus ultimo majori ovato apice acuto. Mandibulæ valde acutæ. Maxillæ membranaceæ lobo unico intus tomentoso. Palpi articulo 1mo. minimo, 2do. et quarto æqualibus, ultimo subsecuriforme. Mentum transversum. Labrum membranaceum fere rotundatum. Palpi labiales breves, articulo ultimo majori securiformi. Caput transversum oculis prominalis. Thorax transversus lateribus rotundatis, angulis posticis acutis elevatis. Elytra sicut in *Telephoris*, in medio nonnihil dilatata. Tarsi 5-articulati, articulo penultimo bilobato.—*Westwood, M. L. J. July 1860, p. 176.**

**ANISOTELUS BIMACULATUS, Hope.**

Long. lin.  $4\frac{1}{2}$ , lat. lin. 2.

*Lividus, elytris 2-maculatis. Antennæ articulo primo testaceo, reliquis fuscis. Thorax rufo-testaceus nitidus, elytris pallidioribus macula ovali nigra in singulo fere ad apicem posita. Corpus in fra testaceum.*

Hab. in Montibus Himalayæ; in Mus. Dom. Royle.—*Westwood, M. L. J. July 1840.*

**ELATER CYANOPTERUS, Hope.**

Long. lin.  $4\frac{1}{2}$ , lat. lin.  $1\frac{1}{4}$ .

*Cyaneus, antennis fuscis, marginibus thoracis pedibusque rubris. Caput nigrum antennis fuscis. Thorax in medio nigro-cyaneus, marginibus lateralibus rubris. Elytra striato-punctata subpubescentia. Pedes rubris.*

Hab. in Montibus Himalayæ; in Mus. Dom. Royle.—*Westwood, M. L. J. July 1840, p. 196.*

**RIPIPHORUS APICALIS.**

Long. lin. 3., lat. lin. 1.

*Rufus, thorace pedibusque nigris, elytris flavo-rufus quatuor maculis notatis. Caput atrum ramo antennarum piceo, foliisque nigris. Thorax concolor. Elytra flavo-rufa, basi nigrofasciata, maculis binis fere mediis, apicibusque cor-*



## EUPHORBIA NETILFOLIA.

poreque infra nigris. Hab. in Montibus Himalayæ, in Mus. Dom. Royle. — *Royle's Illustrations of the Botany, &c. of the Himalayan Mountains, and Supplementary Part by Westwood, quoted in M. L. J. July 1840, p. 137.*

(734) ERUPUNA in Tamil, EREMBURAPAN in Malayala. This tree is of a dark brown colour, with a yellow tinge, and in texture resembles the marda; it is heavy and strong, grows to about fifteen inches in diameter, and from fifteen to eighteen feet long. It produces a small black fruit which is of no use. The natives prefer it to other woods for rice-beaters, from its weight and texture. — *Edye. M. and C.*

(735) ERYTHRINA INDICA. Is conspicuous from its bright scarlet flowers. — *Wight's Ill. In. Botany, Vol. I. p. 192.*

(736) ERZROOM. Erzroom is the Capital of the Pashalic which bears the same name, and is about ten days journey from the Persian frontier. It is built on an elevated plain about 6000 feet above the level of the sea. The cold there is intense, and lasts usually from September till May. Lying on the high road from Persia to Constantinople, it is the resort of many merchants and caravans, but it has not recovered the Russian occupation in 1829, when its fortifications were dismantled, and many of its most opulent and industrious inhabitants, the Armenians, were induced to emigrate. One of the branches of the Euphrates flows at a short distance below the city.

(737) EUGENIA RACEMOSA. Lin. — CLUSTERING EUGENIA.

### The Root.

Cadapum vayr, TAM.		Root of the Cluster-
Kanite vayroo, TEL.		ing Eugenia.
		Neepa, SANS.

This root has a slightly bitter taste, and is considered by the Native Practitioners as a valuable medicine on account of its aperient, deobstruent, and cooling qualities, it is given in decoction. The seeds and bark are also employed, the latter which is of a reddish colour, is said to possess virtues similar to those of our Cinchona. — *Ainslie's Mat. Med. p. 75.*

(738) EUPHORBIA. In China, many plants are cultivated for their oil, to be used in the arts as well as cooking; a strong oil is derived from the seeds of two or three plants belonging to the Euphorbiaceous family, for mixing with paint, smearing boats, &c. It is deleterious when taken into the system, but does not appear to injure those who use or express it. — *Williams' Middle Kingdom, p. 107.*

(739) EUPHORBIA NETILFOLIA. Lin. Oleander leaved spurge.

Elekullie, (TAM.)		Akoojimoodoo, (TEL.)
Putteoon ke saynd, (DUK.)		Puttrakarie, also Seej,
Vurki zukkoom, (ARAB.)		(SANS.)

This tree grows to a good height, differing in

## EXACUM BICOLOR.

that respect from Shuddraycullie and Tirugkocullie, and it would appear to have got its Tamool name from having leaves of considerable size, which neither of the other have, they are of a yellow green colour.

The white juice of this species of Euphorbium the Native practitioners prescribe internally, as a purge and deobstruent, in those visceral obstructions and dropsical affections which are consequent of intermittent fever. It is also, when mixed with margosa oil, used as an external application, in such cases of contracted Limb as are brought on by ill-treated Rheumatism.

This plant is the Daun Sudu Sudu of the Malays. The Javanese, Rumphius tells us, consider the young leaves as stomachic. — *Ainslie's Mat. Med. p. 79.*

(740) EUPHORBIA TIRUCALLI.

Kulli (Milk hedge.) TAM.

Dr. Wight has never seen the wood of this used, but often heard it spoken of as excellent for gun stocks. To him it seemed too light coloured.

(741) EUSPIZA STEWARTI, Bligh, affined to E. cæsia (Cretsch.) Length about  $5\frac{1}{2}$ ; of wing 3 to  $3\frac{1}{4}$  in.; and tail  $2\frac{1}{2}$  in. Crown and front of neck ashy; the ear-coverts and upper-parts of breast albescent-ashy; throat and supercilia black, the feathers of the former margined with whitish towards the chin; lower half of breast, flanks partly, nape, back, rump, upper tail-coverts, and fore-part of wings, deep-ferruginous approaching to maroon, the feathers more or less bordered paler; rest of wings dusky, the feathers margined with brown; and belly and lower tail-coverts buffy-white; tail having its outermost feather  $\frac{2}{3}$  white, and the next  $\frac{1}{2}$  white. A younger male, or seemingly shot earlier in the breeding season, has the fore-part of the wing less rufous, the pale margins to the feathers generally rather more developed, and slight central dusky spots on those of the back. — *Bengal As. Soc. Jo. p. 215, No. 2 of 1854.*

(742) EXACUM BICOLOR, ROXB. *Wight Ic. Pl. Ind. Ort. 1321.*

Stem 4 angled, leaves sessile ovate subacute 3-5 nerved with smooth margins, calyx deeply 4 cleft segments subulate with ovato lanceolate wings corolla white tipped with blue lobes elliptic oblong cuspidate three times longer than the tube which is a little shorter than the calyx. Corolla large, nearly two inches in diameter, cymes terminal subcontracted middle internodes usually shorter than the leaves. Griseb in Decandolle, Prod. J. P. 45. Neilgherries below Kotagherry rare in pastures; about a mile below Nedawuttim abundant flowering during the autumnal months. This plant is well figured in Wight's Specilegium Neilgherrense t. 108 Cuttack Roxburgh, Neilgherries Baron Hugel, Malabar Ghauts Cleghorn. A bundle of the dried stalks of this plant was forwarded to the Madras Exhibi-

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tion of 1855 from Mangalore marked "Country Creyat, price one anna six pie per lb." The name shows that it is used as a substitute for Creyat (*Andrographis paniculata*). In this species, which enamels the sword of the Western Ghats with its beautiful blossoms, the same bitter stomachic

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qualities occur, for which the *Gentiana* is so much employed, and I believe that it may be used with advantage for medicinal purposes as a substitute for Creyat, (*Andrographis paniculata*). —*Ind. An. Med. Science*, p. 270.

## F.

(743) **FAQEERS**, or *Durvesh*, religious mendicants amongst the Mahomedans of whom there are several sects.

In India, this Class of religious devotees are generally

1 The Kadriah or Banuwa	5 Mulling.
2 The Chistee.	6 Rufae or Goorzar.
3 The Shootareea.	7 Jullallea.
4 Tubqateea or Mudareea, also called duffalee.	8 Sahageea,
	9 Naqsh-bundeea.
	10 Bawa peearay.

The Calendar *durvesh* is only rarely seen in India.

(744) **FATEEHAN**, ARAB, prayers offered in the name of Mahomed.

## (745) FELINE ANIMALS OF INDIA.

**ASIATIC LIONS.** In India, there are a considerable variety of animals which are called "Cats" in different countries, and thus we hear of *Civet-cats*, *Genet-cats*, *Marten-cats*, *Pole-cats*, &c.; the Lemurs or *Madagascar Cats*; and the marsupial animals which are known as "wild cats" in Australia, to say nought of the *Shir-mindi billi* of the Bengalis. The "Wild Cats" are a small but savage kind of *Lynx* (the *FELIS RUFA*), and therefore a true Cat. *Bonafide* Cats are very numerous in species, and are of all sizes, from the Lion and Tiger downwards. The Feline tribe, inhabit most countries, and are nowhere more abundant in species than in India and its environs, from the snow-capped Himalaya to Ceylon inclusive, and along the eastern side of the Bay of Bengal and Malacca Straits. Throughout this range of territory we have them of all sizes, from the largest to the smallest; and appertaining to various subdivisions of the great genus *FELIS*. These subdivisions or minor groups, however, have not been satisfactorily established: and one great authority, Professor Temminck of Leyden, gave up in despair the attempt to classify the long series of feline animals otherwise than in order of size. It needs no extraordinary acumen to recognise the type of one sub-group in the Lion, of another in the Tiger, of a third in the Lynxes

ing Leopards or *Cheetas* of books on natural history, and so on; but there are various species which do not conform to any such division, nor possess sufficiently marked characters to stand as the types of peculiar divisions: again, there are local groups; thus among the animals generally classed as Leopards, there is the South American type, with large bull-dog head and comparatively short tail, to which the Jaguar and Ocelots belong,—and also the Asiatic type with very long and thickly clad tail, large body-markings, &c., to which the Ounce or ('Snow Leopard') and several other and smaller animals appertain. It is scarcely worth while here to enter learnedly into this matter; the object of the present communication being rather to discriminate the various feline animals which may happen to fall under the notice of an Indian sportsman.

1. The Lion, *FELIS LEO*; considered by some naturalists as a sub-genus *LEO*, comprising a plurality of species. The Lion, as everybody knows, is the desert king; as the Tiger is monarch of the jungles. Hence, as an Indian animal, he belongs to the N. W. Provinces, from which he is very fast disappearing. In the Honorable Mountstuart Elphinstone's *Account of the Kingdom of Cabul*, which was published in 1815, it is remarked, that—"The Lion, though so common in Persia, and lately found in such numbers in Guzerat and in the *Hurriana*, North-West of Delhi, is very rare in Afghanistan." As regards the latter country, he adds,—“The only place where I have heard of Lions, is in the hilly country about Cabul, and there they are small and weak, compared to the African Lion. I even doubt whether they are Lions.” Lieut. Irwin, who accompanied Elphinstone in his Mission to Cabul, states, in his admirable *Memoir on Afghanistan*, long subsequently published by the Asiatic Society (in 1839), that—"The Lion is a native of Persia, and some are found as far as Tashkund, in a northerly direction and an easterly. There remains no doubt of Lions being found in Hurriana; but in many of the intermediate countries these animals are very rare." These notices are contemporaneous; and one certainly conveys



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animal in the great Hurriana desert than the other does: but it has long since been extirminated in that quarter. So far back as in 1837, the late well known sportsman Major Brown, ('Gunga' of the *Bengal Sporting Magazine*) remarked, that—"Only twenty-three years elapsed from the occupation of the country, when the Lions, which were at one time numerous in the dry and sandy deserts of the Hurriana, became extinct south of the Cuggar, through the ardour of British sportsmen, and, it is supposed, none are now to be found nearer than the Sutlej. Having no inaccessible dens to retire to during the hot weather, the Lions, from necessity, took up their abode where water could be found; and as places of this description were rare, and generally near villages, their retreat was easily beaten up, and their entire destruction speedily effected. In the month of May, the Lion-shooting party had only to ask one question from the people of the country, to know whither they might expect sport?" (i. e. where water was still to be found.) \* \* \* "The largest Lion at present in England was caught, when very young, in Hurriana, by Genl. Watson, and was presented to his late Majesty, Geo. IV." In Vol. 1 of the *Sporting Review*, the Lion is cursorily mentioned as an inhabitant of the territories south of Gwalior in 1845: About eight or ten years ago, (about 1848) there was seen in Calcutta a fine living Lioness, more than two-thirds grown, which had been captured as a small cub in Sindh. She appeared healthy and vigorous; but died in the course of her passage to England. There are also, now, in the London Zoological Gardens, a young Lion and Lioness from Guzerat; which is the stronghold of Leo in this country.

From the accounts of Asiatic Lions, there seem two distinct races of them: one comparatively maneless; the other heavily maned, scarcely (if at all) less so than the African Lion. Of the latter, again, some naturalists distinguish apart the Lions of Barbary, Senegal, and South Africa:

The ordinary Persian Lion is well maned; and this race is said to be identical with the Arabian. A fine Persian Lion and Lioness were long exhibited in the Surrey Zoological Gardens, with a fine S. African Lion and Lioness in an adjoining den; and, to the best of Mr. Bligh's recollection, (and I have seen them often,) "there was not much difference in the development of the mane of those two Lions; but the Persian was a much paler animal than the other." According to Mr. Warwick, "the pair were brought as a present to his late Majesty, George IV., from Bussora, in the *Boyne*, man-of-war, Captain Campbell, who presented them to the Menagerie then at Exeter Change. The Asiatic," he adds, "differs from the South African Lion in being rather less in size, with mane much more scanty, and of a light yellow colour, tipped with

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colour. The head wants the width and nobleness of countenance so apparent in the African Lion. The animal falls off towards the withers more than in the African Lion; the tail is not so delicately tapering, and the tuft at the end of it is much larger in proportion." Naturalist's Library.—*Felineæ*. The above description having been taken from the living beast, with a living African Lion beside it for comparison, must be supposed tolerably correct, so far at least as concerns that particular specimen; but it nevertheless does not accord with my recollection of the identical individual, perhaps from the season at which it was taken; or perhaps the animal was older when I saw it. For I have a very strong impression that the mane was considerably heavier than would be inferred from Mr. Warwick's notice of it, and that the creature was not smaller than its African neighbour. At the same time was exhibited a large emasculated Lion, which was quite maneless, and resembled an enormous fat and lazy Lioness.

The late well known and distinguished sportsman, Major Sir W. Cornwallis Harris, had no faith in the existence of an Asiatic race of maneless or scantily-maned Lions: and be it remembered that he was as familiar with the Lion of Guzerat as with that of South Africa. His very decided opinion on the subject is thus expressed in the letter-press accompanying his *Portraits of the Game and Wild Animals of South Africa*.—"In point of size and complexion the South African Lion differs in no respect from that found so abundantly in Guzerat—one of the only two provinces of India wherein the species exists—measuring usually between ten and eleven feet in extreme length (i. e. the stretched skin!), "and varying in hue betwixt ash-colour and tawny-dun; but generally possessing a more elaborate and matted mane; which peculiarity is attributable, in a great measure, to the less jungly character of the country that he infests, and to the more advanced age to which, from the comparatively small number of his mortal foes, he is suffered to attain. In India the Lion is often compelled to establish himself in heavy jungles, which comb out a considerable portion of the long loose silky hairs about his head and neck; but this is seldom the case in the arid plains of Africa, where the covert being chiefly restricted to the banks of rivers, or to isolated springs, he rests satisfied with a less impervious shade, and is often disturbed from a clump of rushes, barely large enough to conceal his portly figure." Elsewhere, Major Harris remarks, that—"Amongst the Cape colonists it is a fashionable belief, that there are two distinct species of the African Lion, which they designate the *vaal* and the *zwart*, or the "yellow" and the "black," maintaining stoutly that the one is very much less ferocious than the other:

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reader, that both the colour and the size depend chiefly on the animal's age; the development of the physical powers, and of the mane also, being principally influenced by a like contingency. That which has been designated the "maneless Lion of Guzerat" is nothing more than a young Lion whose mane has not shot forth; and I give this opinion with less hesitation, having slain the king of beasts in every stage from whelphood to imbecility."

The so called maneless Lion of Guzerat was brought to the notice of the London Zoological Society by Capt. Walter Smee, of the Bombay Army, in 1833: and an excellent description and coloured figure of it are published in the first volume of the Society's *Transactions*, contributed by that officer. The skins of a Lion and Lioness killed by himself in Guzerat, and presented by him to the Society, were selected from eleven, obtained there by him, eight of which he took to England. "This Lion," he remarks, "is distinguished from those previously known, by the absence of a mane (that is, he is maneless as compared with other Lions,) from the sides of the neck and shoulders; the middle line of the back and neck being alone furnished with longer hairs, which are erect, like those in the same situation in the Hunting Leopard (*Felis jubata*). The under surface of the neck has long loose silky hairs, and there is a tuft at the angle of the fore-legs. Besides the absence of the extensive mane, the tail is shorter than that of ordinary Lions, and is furnished at its tip with a much larger brush or tuft." Capt. Smee's description is too elaborate for quotation here, but he asserts that "in none of his eleven specimens was the mane more extensive than in the male exhibited; and in none of them was it in any degree pendent. A male measured 8 feet 9½ inches in total length, including the tail: its height was 8 feet 6 inches. A female killed at the same time was 8 feet 7 inches long, and 3 feet 4 inches high. The impression made by the paw of the male on the sand measured 9½ inches across. His weight, exclusive of the entrails, was 35 stone of 14-lb. to the stone.

"These Lions," continues Capt. Smee, "are found in Guzerat along the banks of the Sombermuttee, near Ahmedabad. During the hot months, they inhabit the low bushy wooded plains that skirt the Bhardar and Sombermuttee rivers from Ahmedabad to the borders of Cutch, being driven out of the large adjoining tracts of high grass-jungle (*Bhirs*) by the practice annually resorted to by the natives of setting fire to the grass, in order to clear it and ensure a succession of young shoots for the food of the cattle upon the first fall of the rains. They extend through a range of country about forty miles in length, including various villages, and among others those of Booroo and Goliana, near which

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common in this district, that I killed no fewer than eleven during a residence of about a month; yet scarcely any of the natives, except the cattle-keepers, had seen them previously to my coming among them. The cattle were frequently carried off or destroyed, but this they attributed to Tigers: the Tiger, however, does not exist in that part of the country. Those natives to whom they were known gave them the name of *Ontiah Bagh*, or 'Camel Tiger,' an appellation derived from their resemblance in colour to the Camel. They appear to be very destructive to domestic cattle, and the remains of a considerable number of carcasses of bullocks were found near the place at which my specimens were killed: about ten days previously, four donkeys had been destroyed at the village of Cashwa. I could not learn that men had ever been attacked by them. When struck by a ball, they exhibited great boldness, standing as if preparing to resist their pursuers, and then going off slowly and in a very sullen manner; unlike the Tiger, which, on such occasions, retreats springing and snarling.

"In addition to the district in which I have met with them, these Lions are also found on the Rhun near Rhunpore, and near Puttun in Guzerat. Some persons who saw them in Bombay stated that they also occur in Sind and in Persia. How far this latter statement may be correct I cannot determine; but I may remark that the Persian Lion that is at present exhibited at the Surrey Zoological Garden, has none of the characteristics of the maneless Lion of Guzerat, and seems to me to differ but little from individuals known to have been brought from Africa."

In the days of Lord Hastings's rule, it would appear that Lions were common in the great Hurriana plain. A contributor to the *B. S. M.*, in 1833, remarks that "Hansi was then in its 'high and palmy state,' and considered the best sporting country in India. Lions were found in considerable numbers, although lately they have become exceedingly rare. \* \* \* The first Lion-hunt I ever was present at was the most beautiful sight I have witnessed. The party assembled at Hissar, where some of the sporting elephants of the Marquis of Hastings's retinue were stationed. A duffedar's party, of Skinner's Horse, accompanied us. The presence of sowars in Lion-hunting is very necessary; the plains being extensive, the animal is liable to be lost after the first onset, unless sowars are at hand to go out on the flanks, or to push on ahead to mark the jungle the lion retires into. In general, when a Lion is pursued, he will either endeavour to get away by sneaking off, or take to the open country, and there await the attack: the latter, a Tiger is never known to do, and I consider it to form the only peculiar difference of the two kinds of



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gives more exciting sport by far than anything I have seen in Tiger-hunting, and is the most trying for the elephants. \* \* \*

One killed was a young but nearly full-grown male stood exactly 3 ft. high, and was 9 ft. long; *his mane was 9 inches in length*" The famous Lion 'King George,' formerly in the Tower-menagerie, and procured in *Hurriana* when a small cub by the late Genl. Watson, was even renowned for the superb development of his mane! Now for the Lion of Kattywar or central Guzerat. In the *B. S. M.* for July, 1840, is a record of one there slain, of which we read:—"This Lion was 9 feet, *with a flowing mane*, and altogether much more bulky than any Tiger I have killed: although many have measured upwards of 11 feet in length" (which of course means *the stretched skin*). Capt. Smee distinctly states, on the contrary, that the Lion of Guzerat is "destitute of the flowing mane," and that in none that he examined "was it in any degree pendent." Again, in the *Bengal Quarterly Sporting Magazine*, 1., 357 (1844), we read of "a large-maned blackish Lion" in Kattywar.

As regards the comparative size of the Lion and Tiger, I suspect that no Lion, even in Africa, attains to the magnitude of our largest male Tigers: but they are differently-made beasts, as seen by a glance at their skeletons. The Lion is shorter in the vertebral column, and much deeper in the chest; indicative of its capacity for running in pursuit: this the Tiger never does; and its structure is more emphatically that of an animal which springs upon its prey. Nevertheless, the resemblance of the skulls is so great, that there is only one certain mode of distinguishing them, viz, that the nasal bones pass back beyond the maxillaries in the Tiger-skull, and fall short of the maxillary suture in the Lion-skull: besides which the profile of the latter is generally much straighter, while that of the former is more tom-cat like, showing a strongly marked obtuse angle. The close affinity of the two animals is demonstrated by the fact of their having interbred and produced hybrids when in captivity; and it is curious that a newly-born Lion-cub is far from being so utterly unlike a Tiger-cub as might have been expected. "They are at first obscurely striped or brindled, and somewhat Tiger-like in the coat. There is generally a blackish stripe extending along the back, from which numerous other bands of the same colour branch off, nearly parallel to each other, on the sides to the tail. The head and limbs are generally obscurely spotted. When young they mew like a Cat; as they advance, the uniform colour is gradually assumed; and at the age of ten or twelve months the mane begins to appear in the males; at the age of eighteen months this appendage is considerably developed, and they begin to roar." (Bennett's

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states that it is nearly the third year before the mane and the tuft on the tail appear, and that they are not fully developed before the seventh or eighth year. The eminent French naturalist was misinformed. The so-called Bengal Lion (from *Hurriana*) figured by Mr. Bennet was magnificently maned, though little more than five years old. I have noticed, too, that in Lionesses the markings of the young are often more or less obscurely retained till they are full-grown or nearly so. They were conspicuously visible in the Sindh Lioness, about two-thirds grown, which I saw in Calcutta. Lion and Tiger-cubs are, in confinement, apt to suffer much at the time of developing their huge permanent canine-teeth; and perhaps many die at this age when wild. To this cause was attributed the loss of the two litters produced in England of Lion-tiger hybrids. As regards the age to which these animals attain, 'Pompey,' the great Lion which died in 1760, was said to have been in the Tower of London above seventy years; and one from the river Gambia is stated to have ~~stare~~ died there at the age of sixty-three. A neerological table of statistics relative to the length of life of the animals at the Jardin des Plantes, contains the following:—"The average length of life of the Lion, Tiger, and Panther, in a menagerie at Paris, is six or seven years. A Lion, however, has lived 29, and a Lioness 17. Lions, which are carried about and exhibited to the public, are found to live much longer, generally from 17 to 20 years." Major Harris met with an aged wild African Lion, in almost the last stage of decrepitude. He was in company with others of his species, who may have helped to provide for him; for Lions are highly social, if not gregarious, and this one may well have lived on the superabundance of his companions' slaying. Of the venerable beast, he writes,—"There is much repose and grandeur about the mortal remains of Leo, and I never recollect to have seen the asserted resemblance to the human face divine, more perfectly preserved than in this subject, already in the last stage of imbecility. Years had robbed him of his pristine vigour, and the honorable scars of many a fierce conflict seared his scabby hide. His once splendid mane had waxed scant and scraggy, his yellow fangs were worn away to their stumps, and so deeply had age furrowed his savage cheek, that with his overhanging brow and bearded under-jaw, he might have furnished a handsome portrait for a toothless Jew." Those who have only seen and studied these animals in menageries, cannot fail to have remarked the calm and majestic expression of the Lion's countenance, as contrasted with the bestial visage of the Tiger! No contrast can be more striking; nor are the physiognomies altogether deceptive. The Lion's eye recalls to mind the human,—the Tiger's is

nine out of ten sportsmen will affirm) the vertical pupils of a Cat; neither has the Leopard's.

A correspondent of the *B. S. M.* (for 1841,) thus writes of the Lions of Kattywar:—"Glad as I should be to agree with so accomplished a sportsman as Capt. Harris, and knowing at the time I write this, that he has killed more Lions than any man on this (the Western) side of India, yet having nearly accomplished fifty head myself, I wish modestly to observe that there were, three years ago, in Kattywar, Lions with very dark skins, and which in fact were called by the natives *Kalphoota*, which means in these parts 'black skin,' or 'black stripe.' These said Lions, thirteen in number, charged most desperately; and I think they made good some seven or eight charges upon the head of Capt. Harris's quondam elephant, 'Mowlah' by name. Since this batch I have killed many, but none in colour or courage like them: their skins were sent to a friend of mine in Bombay two years ago, who was formerly in one of our cavalry regiments, and is at present a well-known capitalist! and besides, out of all the Lions I have killed, 9 feet 2 inches is the longest I have seen. Before taking the skins off for curing, they are stretched to 11 feet frequently. I merely mention this fact to prove (!) that the breed is degenerating; or that Capt. Harris, who hunted this country some years before me, must have had the cream of the feline." I believe that this gentleman gives the correct measurement of the animal, as distinguished from that of its stretched skin; and he supplies a list of twenty Lions and Lionesses killed (by himself?) in Kattywar, during 1840 and 1841.

So far as I can learn, the breed seems now to be completely exterminated throughout the Hurriana desert, and in Sindh and the adjacent districts of the Punjaub. Can any of your contributors supply information on the subject? And is this grand animal to be utterly extirpated even in Guzerat, without so much as a museum specimen having been preserved to shew what a maned Indian Lion was like? The few that remain to fall by the sportsman's gun should now at least be carefully preserved, both skin and skull, and the museums of the different Presidencies, of the India House and others, be supplied with specimens. Even in Kattywar, the race must surely be fast diminishing in numbers and verging towards extinction? Can any reader inform us of the number of Lions slaughtered there during the last few years?

\* Mr. Bennett (in his *Tower Menagerie*) relates that in the commencement of year 1823, the late "General Weston, then in service in Bengal" (he should have said Hurriana,) being out one morning on horseback, armed with a double-barrelled rifle, was suddenly surprised by a large Lion, which bounded out upon him from the

He instantly fired, and the shot taking complete effect, the animal fell dead almost at his feet. No sooner had the Lion fallen than the Lioness rushed out, which the General also shot at, and wounded severely, so that she retired into the thicket. Thinking that the den could not be far distant, he traced her to her retreat, and there despatched her; and in the den were found two beautiful cubs, a male and female, apparently not more than three days old. These the General brought away: they were suckled by a goat and sent to England, where they arrived in September, 1823, as a present to George IV., and were lodged in the Tower." The male was the animal from which Mr. Bennett gives his figure and description of the so-called "Bengal Lion;" and he was remarkable for *the superb development of his mane*, when little more than five years old, at which age the wood-cut of him was executed by Hervey. In Moorcroft's Narrative of his "Journey to Lake Manasarowara," published in the '*Asiatic Researches*,' Vol. XII., p. 512, the following curious passage occurs:—"We were told that on the summits of the neighbouring mountains there was a large red tiger, which feeds on elks and the largest kind of game, but seldom comes to the lower part of the country. He is described to be of the size of a small horse [in a land of ponies], his neck is covered with hair so long as to fall over his face and almost conceal his head, as he comes down hill. From this account it is presumable that the animal is a lion." Not very likely.

The sum of our present evidence seems decidedly adverse to the belief that a maneless (or comparatively maneless) race of Lions exists in Guzerat: but that such a race inhabits Mesopotamia is considerably more probable; and the question should be settled by transmitting live specimens of this alleged maneless race to Europe, which in time would develop as fine a mane in captivity as when wild, should their nature permit of the adornment. Witness the Hurriana cub sent to England by the late Genl. Watson. What was done with this fine Lion after death I know not, but he surely should have been made over to the British Museum.—*Mr. Bligh in Ben. Sp. M.*

(746) *Felis ornata*, GRAY, (founded on an exceedingly bad coloured drawing, obviously by a native artist, published in Hardwicke's Illustrations of Indian Zoology; *F. servalina* apud Jardine, Nat. Libr. Felinae nec *F. servalina*, Ogilby,) *F. ad Oxam*, Pallas (apud Gray,) *F. Huttoni*, Bligh (founded on a skin from the Hazara hills), *Chaus servalina*. Gray, Brit. Mus. Catal.

This wild species approximates very nearly to the domestic Cat. The ground colour of the fur is a "Cat Gray," more or less fulvescent or better described as pale grayish-fulvous in some speci-



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tend to unite into transverse bands on the sides : on the head, nape and shoulders, the spots are smaller and less distinct, and tend to form longitudinal lines on the occiput and nape, but not upon the back. On the limbs there are distinct cross bands, with one or two broad black streaks within the arm, as in the Chaus and commonly in domestic cats; the paws blackish underneath: cheek-stripes as usual, breast spotted, but the belly almost free from spots: tail tapering more or less distinctly, and marked with a series of well defined rings and a black tip: ears externally dull rufous, with a slight but distinct duskyish pencil tuft at tip, not black tipped as in the Chaus, nor is their rufous colour nearly so bright as in that animal, differing little from the general hue of the body: the fur according to locality or perhaps season is more or less dense or full; and the markings are much brighter and more distinct in some individuals than in others.—*Jour. As. Soc. of Beng. November, 1856, p. 441.*

Of two supposed wild types of the domestic Cats of India, obtained by Mr. Theobald in the Punjab Salt Range (two specimens of each of them,) neither can be referred to the *F. ornata*: they have much more the appearance of domestic cats; and so they undoubtedly would have, were they really two aboriginal types which are still strongly indicated by the domestic cats even of Bengal. One is the streaked or spotted type, the colouring and markings of which are not much unlike those of the European wild cat (*F. Sylvestris*, Brisson); only more distinct, and the transverse streaks are more broken into spots, especially towards the hinder part of the body; the fur, however, is short, and the tail slender and of uniform apparent thickness to the end; showing a series of rings and a black tip: ears slightly rufescent externally, but infuscated, passing to black at tip where there is a distinct small pencil tuft of black hairs; paws deep sooty black underneath, I lately saw, at Allahabad, an exact counterpart of this alleged wild race in a domestic Grimalkin; but, in general, the domestic Cats of this type, about Calcutta at least, are greyer, with the spots smaller and more numerous. The other type much resembles *F. Chaus* in colouring, but does not at all approximate to that animal in its proportions: it is much smaller than the Chaus, with proportionally shorter limbs, smaller ears, and much longer tail, which last distinctly tapers at the extremity, consequently, it exhibits no tendency to the *Lynx* form and character, so conspicuously manifest in the Chaus. The body is uniformly grizzled "cat-grey" more or less rusty or fulvescent, without a trace of spot or stripe, such as may generally be discerned faintly in the Chaus: but the bands on the limbs are much more distinct than in that animal, those of the tail equally

## FIBROUS PLANTS OF WESTERN INDIA.

head and cheeks (much confused albeit on the former). And a dark band across the chest: lower parts more or less whitish or tinged with fulvous, and marked with blackish or brown-black spots: ears dull, rufous behind, with a slight blackish tip and no pencil-tuft of hairs: the paws more or less sooty underneath. Domestic Cats of this type abound in Bengal, if not generally over India: but such a coloration is utterly unknown among those of Europe: and the proper tabby markings (pale streaks on a black ground, peculiarly and symmetrically disposed), so very common in English Cats, are never seen in those of India! The tabby may be a modification (and a very remarkable one) of the markings of the wild *F. sylvestris* of Europe, a result of domestication but most assuredly the Chaus coloured cats of India would seem to indicate an aboriginally wild stock of that colour, no doubt inhabiting the country somewhere: but if a truly and aboriginally wild specimen were to turn up, it would merely be regarded as a stray member of the domestic race, and so an end to all enquiry.

The only guide to a probably correct result would be the fact, that such animal might inhabit a vast range of country, away from human haunts, without exhibiting the variation of colour everywhere observable in the domestic races; unless in neighbourhoods where it might interbreed with the latter which would pass for nothing: though to such neighbourhoods it would doubtless be attracted, just as the Chaus is! The question then remains—Do two such Feline types exist, or either of them, in an aboriginally wild state, in any part of India, as have just been described, and both of which are said to be found wild in the Punjab Salt Range? The difficulty of tracing the origin of many of our domestic animals is well known.—*Jour. As. Soc. of Beng., No. V. 1856, page 442-3.*

(747) *FELIS MOORMENSIS*, HODGSON.

(748) *FERONIA ELEPHANTUM*, ROXB.

### *The Fruit.*

Vallam pullam, TAMIL.	Kuet, HINDOOIE.
Kavit, DUK.	Wood Apple, ENG.
Velagapundoo, TEL.	Kapitta, SANS.

The rather acid pulp contained within the hard shell of the Vallam pullum is eaten with sugar but is not much prized. The tree is more prized for its valuable gum.—*Ainslie p. 234.*

(749) FIBROUS PLANTS OF WESTERN INDIA being from Art. II. on the use of Fibrous Plants in Bombay Review.

On the Western side of India we are less richly provided with those gigantic grasses, which in the valleys of the Ganges and Brahmapootra form such important parts of household economy. Still in our forests or dangs and in some of the internal rivers of Guzerat there are supplies sufficiently

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try to turn them generally to account. That they can be partially worked up into a shape at once useful, light, and elegant, may be seen in those tent-houses constructed of reeds which form the dwellings of our Indian gipsies, gopalas and other wandering tribes. Some of these huts can with ease be carried on a small donkey, and the material is so closely woven as to resist the heaviest rain. Possibly, had our brave troops at Sebastopol possessed a few thousands of them they might have been saved much sickness and suffering between November and March. That the use of such fabrics is not extended even to our floors is a proof how backward certain small but very useful branches of art are with us in Bombay. Our most finished artisans in Bombay cannot turn out a decent tent screen or chick. They have not yet got beyond a few coarse strips of bamboos strung together. Yet in this small branch of art thousands of people might be employed but instead however we go on purchasing China matting to the detriment of our purses as well as of our poorer population. Why should not young Bombay make a beginning in this division of industry. It is true that in Sind the manufacture is more extended and the grass chairs of that province as well as the boat mats are models for lightness and comfort.—Page 253.

*Musa textilis.* We now turn to the Plantain Tribe or Musas, about which Doctor Royle is as usual full of information collected as well as original. We may however state that he errs in one point of great importance, viz., that the wild Plantain (*Musa textilis*) is not indigenous in India. It can be shewn on our Ghats from Cape Comorin Northward, and if hitherto it has not been turned to full account this may be ascribed partly to ignorance or apathy on the part of those whose mountains afford many other fibres; and partly to the fact, that in the northern slopes of the Ghats, the plant does not reach a height fitted to afford a fibre or more than two feet in length. Strength it has as is well known to the Ghat people who employ it occasionally for domestic purposes in rope-making as well as the stem for food. However it is a question whether in our more Northern Ghats in which the growth is common the stem be not too short to allow of its being worked into exportable fibre.—Page 254.

*Cocoanut.* In Malabar and Ceylon every available spot within the influence of the sea breeze is being devoted to the growth of the Cocoanut, and an intelligent traveller has lately informed us that along the Western coast of the Madras provinces the wavy downs near the sea borders which have erst been barren and produced only a stunted and worthless crop of grass are being every where levelled broken up and manured so as to form the beds of future plantations, the only impulse being a steady de-

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velopment of the resident Collector (Mr. Maltby) who gives a perpetual lease of such ground at the easy rate of one rupee per acre.

The value of the coir produce depends so greatly on the previous manipulation that it appears most desirable to have it exported from the principal seaward ports, under the inspection of Custom-house or other authorities as used to be done in former years. We have been given to understand that since the abolition of the practice of government inspection, the coir prepared by private hands bears a relative value from 70 to 90 per cent. inferior to that prepared under the eye of public functionaries. We believe that a proposal to re-establish the old system was negatived as at variance with the principles of political economy.—Page 255.

*Linseed.* We conceive that Dr. Royle is in error when he states that this crop is never sown thickly or in continuous fields. We have seen it thus grown in many situations and such we believe to be the general mode of its cultivation in the Linseed-producing provinces. In our poorer Western districts it is often sown as an edging crop to wheat and other grain because it is not eaten by cattle in the green state. The reason given for its being sown in both long and cross drills is that the plant being weakly requires much sowing to guard it against the action of the weather and a very good and sufficient reason it is.

*Bast.* Of these our substitutes for Bast we need only remark that while they rank among the easiest grown and most extensively distributed of all our forest trees, they usually suffer more from the axe of the woodsman and the flames lighted by the cultivator of the jungle, &c., than almost any other class of trees. Consequently in places where they were once abundant, trees are now rare so that we can hardly expect to obtain their fibres in sufficient quantities for exportation.

It is true that in forests under the Western Ghats far to the southward they are still to be found in considerable numbers, but in such places the population is too scattered and migratory to take up the manufacture steadily and on an extensive scale. Provided they get a supply for making nets to catch the elk or fetters for the tame elephant they generally seek no more. For the latter purpose they frequently use the bark of some of the Sterculias.—Page 259.

*Crotalaria.* These remarks may serve as an introduction to the important subject of Sunna or Crotalaria fibre, as the Hibiscus Cannabinus or Ambaree, need be but lightly noticed, for it is not likely to be ever largely exported, and its uses will continue to be chiefly confined to the agricultural population of its native spots. With respect to the Sunna fibre we may observe that it is daily becoming an article of increased export and of growing importance particularly in



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the great agricultural districts to the east of the Godavery, and hundreds if not thousands of carts may now be seen conveying it in the dry season from the Eastern parts of Barsi, Pangam and Sholapore towards Bombay. Nor is it here only that such activity is observable, it is just as great in Malabar, Canara, Darwar, Mysore, and all the great grain countries to the south. In Khandeish, the quantity grown has more than doubled during the last ten years. In the Conkuns, owing to local causes which we shall notice hereafter, its culture has remained stationary if indeed it has not decreased. Throughout the greater breadth of Guzerat the land is too valuable to admit of its being subjected to the rotation of a crop held in so little esteem as this, both Brahmans and the higher classes of cultivators consider it beneath them to cultivate sunn, indeed there is a common belief, that a cow in calf, if tied with a rope of Sunna will miscarry. In Guzerat, however, it is often sown for a green manure being ploughed in to the land just after the flower has appeared. Also in the collectorate of Broach, it is somewhat extensively cultivated on those broken lands and edges of ravines which decline from the level of the Khannum or black soil to the Myhee river. In cleared patches of the different forests which skirt and lie at the foot of the Ghats, it is said to be regularly cultivated as a rotation crop. In Khandeish the Brinjaries, (the great grain carriers of the country) grow it in spaces which they clear near their temporary camps in the rainy seasons and in the hilly parts of Mysore, large camps of the same wandering tribe may be seen with their small huts or lightly stretcheed tents of cloth pitched near the slope of a great river, while their cattle are browsing among the neighbouring heights, and whole families are busied either in attending to the cultivation of Sunna or in working up such material as they have collected from the crop into twine and cloth. For the former purpose the hemp has to be prepared by a tedious and laborious process of beating on a flat stone or wooden block, successive blows being dealt by the men, each of whom is armed with a heavy club. By this means the woody fibre is pretty effectually got rid of and the article is then handed over to the women, boys and girls of the company to be by them spun into twine on the rude spindle or pirn which they always carry with them. It is no uncommon thing to see one of their stout wiry and bronzed vizages—for such they always appear in the line of march, stalking along with a child on her back, her eye fixed on the movements of the cattle and both her hands employed in mechanically twisting the fibre of the twine on this spindle.

In our districts below the Ghats the cultivation of some is limited to that grown by the wilder mountain tribes, and the Mussulman and Hindoo fishermen for their nets. Further cultivation seems to be restrained partly by fiscal

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measures and still more by the want of fresh water for steeping the fibre.—Page 260.

We have alluded to the practice of sowing the Sunna plant for the purpose of a green manure. This is but one of many instances which prove that the natives appreciate more fully than they have been supposed to do the effect of manures decomposing in the soil and we have also authentic documents to show that very many years ago the use of liquid manure specially carted for the purpose of distribution was common in some parts of the country.—Page 262.

*Combretaceæ.* The withes of two species of the Combretaceæ are extensively employed in the place of iron stretchers for the mouths of the leathern sacks used in drawing water from wells.—Page 263.

*Cannabis sativa.* We may mention that the Mussulman population are just as great consumers of the hemp product as the Hindus. In Sind the extent to which it is used by all classes is frightful.—Page 264.

*Paper.* Dr. Royle concludes by devoting a short chapter to “materials for paper making,” noticing also some of the places at which paper is manufactured. To this we need only add, that in Western India paper is made at numerous places as Ahmedabad, Surat, Dharwar, Kolapore, and Aurungabad, that in every manufactory which we have seen the workmen were all Mussulmans, that the paper made at Aurungabad bears the palm as to fineness and gloss, hence the demand for it to engross sunnuds deeds and other such documents. For royal use, as may be seen in the private account books of the late Peshwa Bajee Rao, grains of gold leaf are mixed with the pulp and thus becomes spread over the surface of the paper. We believe that in all cases the pulp is formed from old grain bags originally made from the *Crotalaria* Hemp or Sunne. Although the import to Bombay from Bengal of jute gunny bags for packing is considerable, we have never known them applied to the manufacture of paper.—*Bombay Quar. Review*, page 265 of No. IV. of 1855.

*Fibrous plants of Travancore.*—*Ailantus malabaricus*, *Paroomarum*, *Malayalum*, Inner bark. Not much used.

*Agave americana.*

*Acacia leucophloea*, Oody nar. This tree is common near Cape Comorin. The fibres from the bark are used by the fishermen in making nets. A coarse kind of cordage is also made from it.

*Aloe indica*, or *vulgaris*, Kuttally nar.

*Asclepias gigantea*, Ericoo nar, Common.

*Bauhinea tomentosa*, Vellay Aateenar.

*Callicarpa lanata*, Thondy nar. Inner Bark. Not much used.

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*Crotalaria juncea*, Canambo or Wuckoo. Cultivated extensively in the Southern districts. It is not exported. Fishing nets are made from them; the best kinds are grown in the Northern districts.

*Cordia obliqua*, Pothooveroosen nar. Moderate strength.

*Erythrina indica*, Moorookoo nar. Moderate strength.

*Ficus indica*, Aallen nar. Not much used.

„ *mysorensis*, Kul-aallun nar. Not much used.

*Grewia rotundifolia*, Oonoo. Moderate strength.

*Isora corylifolia*, Kywen nar. This is the most valuable fibre in Travancore. The plant grows abundantly at the base of the hills. It is from the stem of this shrub that the natives produce fire.

*Mimosa Intsia*, Eenjy nar.

*Sida populifolia*, used for Cordage. &c.

*Strychnos potatorum*, Kathaven nar.

*Smilax ovalifolia*, Krinkoddy nar. Used for tying bundles. &c.

*Sansevieria zeylanica*, Marel nar. Excellent fibre when well prepared.

*Terminalia alata*, Mooroothen nar. Bark, very strong and lasts many years: used for dragging timber, cordage. &c. Common in the forests.

*Terminalia bellerica*, Umburathee nar.

*Pandanus odoratissimus*, Thalay nar. This plant grows abundantly in Travancore along the backwaters and canals, the fibres are extensively used, being good and strong.—*M E J. R.*

(750) **FICUS**. Of this genus are the Banyan *Ficus indica* or Ala nar, Peepul, *Ficus religiosa* or Arasa nar, *Ficus racemosa*, Atti nar, *Ficus oppositifolia*, Bodda nar, *Ficus* (?) Culletthy nar, and the *Ficus tomentosa*.

(751) **FICUS BENGALENSIS**. (*Nyong bondee*, Bur.) is the genuine banyan.

(752) **FICUS RELIGIOSA**. (*Pipal*, Bur.) often called *Banyan*, is the sacred tree of the Burmans. Under it Gaudama is said to become a Boodh. It is common in every part of their country. The branches do not descend and take root like the genuine banyan. It is a very noble tree, and bears a fruit the size of a grape, of which birds are fond, but which is not eaten by man. One of these grows over the brick baptistry, in the Mission compound at Maulmain, extending its branches also over the street. On its young and flourishing branches the Burmans sometimes hang lighted lamps as a deed of merit.—*Malcolm's Travels in South Eastern Asia*, V. I. p. 186.)

(753) **FIGHTING STRENGTH OF THE FRONTIER CLANS OF INDIA**. Writers have from time to time described the policy adopted by the British Government towards these clans, and its success appears at last to be acknowledged. We question, however, whether the magnitude of

that success is even yet thoroughly appreciated. The immense length of the territory to be watched, the barbarous names of the clans who from time to time descend upon the plains, and the apparent want of connection in our own movements perplex and weary the most attentive. The public thinks of “the frontier” much as if it were an outlying station in some danger from the tribes around. We have seen some statistics which will, we think, tend to diminish this delusion. They shew that the clans whom we have compelled to respect our territory, can turn out a force greater than the whole Army of Bengal. That they require even now an army of observation greater than the force which defended the Peninsula. That the Government has in fact placed the chain upon tribes as wild and almost as numerous as those who have for centuries maintained the independence of Arabia.

The numbers stand as follows. Beyond British territory we have,

### Fighting men.

Tribes on Huzara Frontier and near the

Indus—North of Peshawur, ...	8,000
Swat and its dependencies, ...	20,000
Momunds, ...	12,000
Afreedies, ...	20,000
Oruckzyes and other Tribes in Kohat Frontier, ...	30,000
Wuzceries, ...	20,000
Sheoranees and others in Dehra Ismael Khan District, ...	5,000
Belooch Tribes on Dehra Ghazee Khan border, ...	20,000

Total 135,000

Besides the above there are other warlike Tribes within British Territory with the following numbers of

### Fighting men.

Turnoulees (including Jehandad), ...	8,000
Other Tribes of Huzara ...	10,000
Eusufzye, ...	25,000
Khuttucks, ...	12,000
Bungushes, ...	15,000
Derajat Tribes, ...	10,000

Total 60,000

These men are all, be it remembered, trained from boyhood to the use of arms. All can use the tulwar, the long assassin's knife, and the long and heavy matchlock. All are fanatic Mussalmans, clinging like mountaineers everywhere to the worst dogma of their faith, that the slaughter of an infidel is the readiest road to heaven. All, too, are accustomed to consider plunder the easiest source of income, and robbery the only profession worthy of an honourable man. Add to these facts, that they have for ages regarded the people of the plains as serfs born to till for the benefit



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of the mountain and that these serfs can be attacked through all the passes of ranges which extend for eight hundred miles, and the task of the Government may be partially comprehended. The figures, too, may serve to explain the necessity for the great force which is now concentrated in the frontier stations:—

	Regular.	Irregular.	Total.
Huzara, ... ..	1,884	1,884	
Peshawur, ... ..	10,754	2,538	13,292
Kohat, ... ..	67	3,559	3,626
Dehra Ismael Khan,	3,204	3,204	
Dehra Ghazee Khan,	1,615	1,615	
<b>Total</b>	<b>10,821</b>	<b>12,800</b>	<b>23,621</b>

It is fortunate, if not for the existence, at least for the stability of our rule that these tribes are incapable of combination. They live in incessant bloodshedding feuds. Life for life is the universal law of the mountain, and the feud once commenced can end only with the destruction of one clan or the other. They have but one common bond, the hatred of the infidel, which from time to time urges individuals to acts of homicidal frenzy. That bond, however, is sufficiently powerful to give rise to some apprehension. A union among these tribes is considered in the Punjab an impossibility. Feuds as deadly were pacified in Arabia, when tribes equally wild and not more fanatic united for the conquest of the Oriental world.—*Friend of India*, 3 April, 1856.

(754) FISHES OF THE CELEBES. A Contribution to the knowledge of the Ichthyological Fauna of Celebes.—By Dr. BLEEKER, Director and Secretary of the Batavian Society of Arts and Science, &c.

The Ichthyological Fauna of the great island of Celebes has, up to this day, never been treated of by itself. The few notices regarding it are scattered through some Ichthyographic and Ethnographic works, principally in the treatises entitled—

“Schetsen uit de oostelyke streken des Indischen Archipels, door Jelluller.”

“Overzicht der uit de Sunda en Moluksche Zeen bekende visschen van de geslachten Amphiprion, Premnas, Pomacentrus, Glyphisodon, Dascyllus en Heliases, door H. Schlegel and J. Muller.

Both are inserted in the “Verhandelingen over de natuurlyke geschiedenis der Nederlandsche Overzeesche bezittingen” as well as in the “Histoire Naturelle des Poissons” by Cuvier, and Valenciennes.

In the various works I find mentioned 91 species of fishes belonging to the fauna of Celebes. Dr. Muller alludes to the existence of some genera at this place, without giving a description of their different species.

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By comparing all the known genera and species I obtained the following summary:—

Families.	Genera.	Species.	Families.	Genera.	Species.
Percoides, ... ..	13	21	Scopelini, ... ..	1	1
Scleroparei, ... ..	3	4	Clupesoces, ... ..	2	2
Scenoides, ... ..	4	5	Clupeoides, ... ..	4	2
Sparoides, ... ..	3	3	Pleuronectoidei, ... ..	2	0
Chaetodontoidei, ... ..	10	5	Lophobranchii, ... ..	1	0
Osphronemoides, ... ..	2	2	Balistini, ... ..	3	3
Scomberoides, ... ..	7	11	Gymnodonta, ... ..	1	2
Theutides, ... ..	1	1	Seyllia, ... ..	1	1
Mugiloides, ... ..	2	1	Carchariae, ... ..	2	2
Gobioides, ... ..	5	5	Squatimorajae, ... ..	1	1
Labroides Ctenoides, ... ..	4	10	Torpedines, ... ..	1	1
Labroides Cycloides, ... ..	6	2	Trygones, ... ..	1	1
Siluroides, ... ..	3	1	Myliobatides, ... ..	1	1
Scomberesoces, ... ..	3	5			
	66	176		87	93

The genera and species here mentioned are detailed in the following table. The habitats of many of these are known; of others nothing is yet ascertained, but that they are found on and along the coasts of Celebes:

Families.	Species.	Habitat.
Percoides.	Ambassis Dussumieri, C. V. ....	Celebes.
	Apogon novemfasciatus C. V. ....	Macassar.
	„ nigripinnis C. V. ....	„
	Serranus Corallicola K. V. II. ....	„
	„ merra C. V. ....	„
	„ sexfasciatus K. V. II. ....	„
	Diacope sebae C. V. ....	„
	„ notata C. V. ....	„
	„ bitaeniata C. V. ....	„
	Mesoprion unimaculatus Q. G. ....	„
	„ annularis C. V. ....	„
	„ taeniops C. V. ....	„
	„ fuscescens C. V. ....	„
	Diploprion bifasciatum K. V. II. ....	„
	Dules maculatus C. V. ....	Celebes. Aqul.
	Therapon serons C. V. ....	Macassar.
	Holocentrum orientale C. V. ....	„
	Sphyracna Commersonii C. V. ....	„
	Sillago acuta C. V. ....	„
	Polynemus tetradactylus C. V. ....	„
	Upeneus vittatus C. V. ....	„
Scleroparei.	Slatycephalus scaber Bl. ....	„
	„ pristiger C. V. ....	Celebes.

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Families.	Species.	Habitat.	Families.	Species.	Habitat.
Sciaenoidei.	Scorpaena picta C. V.	Macassar.	Labroidei.	Colionymus . flamē- tosus C. V. ....	Menado.
	Pterois zebra C. V. ...	"		Platyptera aspro K.	Celebes.
	Otolithus argenteus K. V. H. ....	"		Amphiprion ephippi- um C. V. ....	
	Umbrina kuhlii C. V.	"		" percula C. V.	Celebes.
	Pristipoma kaakan C. V. ....	"	Ctenoidei.	Premnas trifasciatus C. V. ....	Macassar.
Sparoidei.	Scolopsides voimeri C. V. ....	"		Pomacentrus trimacu- latus C. V. ...	Celebes.
	" lycogenis C. V.	"		" nigricans C. V.	"
	Dentex obturus S. Mull. ....	"		Pomacentrus albifas- ciatus M. Schl. ....	"
	Genes filamentosus C. V. ....	"		Glyphisodon rathi C. V.	"
Chaetodontoidei	Caesio erythrogaster K. V. H. ....	"	Labroidei.	" bengalensis C. V. ....	"
	Chaetoidei. ....	"		" celestinus C. V. ....	Menado.
	Heniochus macrolepi- dotus C. V. ....	Celebes.		" melas K. V. H.	Celebes.
	Zanclus cornutus C. V.	"		Corfypus schoenleinii Aq. ....	"
	Drepane. ....	Macassar.	Cycloidei.	Julis, ....	Macassar.
Osphronemoidei	Scatophagus. ....	"		Novacula pentadactyla C. V. ....	Celebes.
	Holacanthus. ....	"	Siluroidei.	Cheilinus, ....	Macassar.
	Platax. ....	"		Epibulus, ....	"
	Pimelepterus indicus K. V. H. ....	"		Scarus, ....	"
	" marciae Q. G.	Celebes.		Pimelodus, ....	"
Scomberoi- dei.	Yoxotes jaculator C. V.	Macassar.	Scomberoso- ces.	Clarias, ....	"
	Anabas scandens C. V.	Celebes.		Plotosus lineatus C. V.	Celebes.
	Ophicephalus theatus Bl. ....	Tondano.		Belone annulata C. V.	"
	Cybium guttatum C. V. ....	Macassar.		" timucoides set- tull, ....	Macassar.
	Cybium Commersonii C. V. ....	Macassar.	Scopelini. Clupeoidei.	Hemiramphus mela- nurus C. V. ....	Celebes.
Mugileidei.	Trichicirus. ....	"		" erythrorhyn- chus C. V. ....	Macassar.
	Chorinemus aculeatus C. V. ....	"		Exoco-cotus, ....	"
	" mauritianus C. V.	"		Saurus Badicua, ....	"
	Caranx Rottleri C. V.	"		Clupea (species plures)	"
Theutidei.	" Forsteri. ....	Celebes.	Clupesoces.	Engraulis, ....	"
	" Xanthurus K. V. H. ....	Macassar.		Elops saurus C. V.	"
	Coryphaena chrysu- rus C. V. ....	"		Megalops indicus C. V.	"
	Stromateus niger C. V. ....	"		Chirocentrus dorab C. V. ....	"
	Mene maculata C. V.	"	Clupeoidei.	Notopterus kapi- rat Lac, ....	"
Gobioidei.	Amphacanthus vulpi- nus M. Schl. ....	Celebes.		Plueronec- toidei.	"
	Mugil. ....	Macassar.		Hippoglossus. ....	"
	Cestraeus plicatilis C. V. ....	Celebes Aq- dul.		Syngnathus (spec plures) ....	"
	Gobius Celebius C. V.	"		Balistes lineatus Schn.	"
	Sicydium Cynocephala C. V. ....	Menado.	Balisteni.	Aluthera barbata S. Mull. ....	"
	Eleotris velo-brancha C. V. ....	" Aqdul.			



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Families.	Species.	Habitat.
Gymnodonta	<i>Triacanthus biaculeatus</i> C. V.	Macassar.
	<i>Tetraodon Honkenii</i> Bl.	"
	<i>Argenteus</i> S. Mull.	"
Scyllia.	<i>Chiloseyllum punctatum</i> M. H.	"
Carchariae.	<i>Carcharias</i> (Prionodon) sorrah Valen.	"
	<i>Sphyrna Blochii</i> M. H.	"
Squatino- rajae.	<i>Rhynchocoatus laevis</i> M. H.	"
Torpedines.	<i>Narcine Timlei</i> M. H.	"
Trygones.	<i>Taeniura lymina</i> M. H.	"
Myliobatides	<i>Aetobatis flagellum</i> .	"

The above review shows sufficiently the analogy of this fauna to that of Java. Yet there are numerous species among those enumerated, which were never observed by me on or near the coast of Java, and which are nowhere mentioned as being found on these coasts. The species not known in Java are the following, viz:—

<i>Apogon novem fasciatus</i> C. V.	<i>Eleotris velobrancha</i> ... C. V.
<i>Serranus merra</i> C. V.	<i>Amphiprion ephippium</i> Schn.
<i>Dicope bitaeniata</i> C. V.	" <i>percula</i> C. V.
<i>Mesoprion taeniops</i> C. V.	<i>Pomacentrus albifasciatus</i> M. Schl.
" <i>fuscescens</i> C. V.	" <i>nigricans</i> C. V.
<i>Dules maculatus</i> C. V.	<i>Cossyphus Schoenleinii</i> Agaz.
<i>Platycephalus pristiger</i> C. V.	<i>Novacula pentadactyla</i> C. V.
<i>Pterois zebra</i> C. V.	<i>Belone annulata</i> C. V.
<i>Dentex obtusus</i> S. Mull.	" <i>timucoides</i> S. Mull.
<i>Chorinemus mauritanus</i> C. V.	<i>Hemiramphus melanurus</i> C. V.
" <i>aculeatus</i> C. V.	" <i>erythrorhynchus</i> C. V.
<i>Caranx Forsteri</i> C. V.	<i>Alutera barbata</i> S. Mull.
<i>Coryphaena chrysurus</i> Lac.	<i>Tetraodon Honkenii</i> Bl.
<i>Amphacanthus vulpinus</i> Mschl.	" <i>argenteus</i> S. Mull.
<i>Certraeus plicatilis</i> C. V.	<i>Narcine Timlei</i> Henle.
<i>Gobius celebius</i> C. V.	<i>Aetobatis flagellum</i> M. H.
<i>Sicydium cynocephalum</i> C. V.	

Consequently, according to our present knowledge, we have 33 of the above enumerated 93 species, which are entirely strangers to Java, whilst the remaining 60 are found inhabiting the waters along the coast of Java.

Some weeks ago I received a small collection of fishes from Macassar, for which I am indebted to the kindness of my friend, the naturalist traveller Zollinger, who collected them for me during his stay at that place. Though this collection consists only of 21 species, yet it is remarkable for the following peculiarities, viz.

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1st. 15 species are new to the Fauna of Celebes.

2nd. 4 species cannot be classified amongst the genera known hitherto, but render it necessary to form 4 new genera.

3rd. Besides these, 4 or at least 3 species, there are 8 others also new to science, so that one half of the collection consists of species altogether unknown.

4th. The remaining 4 species already known also belong to the fauna of Java.

The species of this collection belong to 9 families and 18 genera, viz.

Percoidei. <i>Therapon theraps</i> C. V.	Siluroidei <i>Plotosus lineatus</i> C. V.*
<i>Holocentrum leonoides</i> Blkr.	Scopelini <i>Saurus badi</i> C. V. *
<i>Sillago acuta</i> C. V. *	Clupeoidei <i>Clupea gibbosa</i> Blkr.
Sparoidei <i>Dipterygonotus leuco-grammicus</i> Blkr.	" <i>argyrotaeniata</i> Blkr.
<i>Apogonoides macassaricus</i> Blkr.	" <i>macassariensis</i> Blkr.
Chaetodontoidei <i>Drepane guttata</i> C. V.	Amblygaster <i>clupeoides</i> Blkr.
<i>Scatophagus argus</i> C. V.	Engraulis <i>Zollingeri</i> Blkr.
<i>Toxotes jaculator</i> C. V. *	Balistini <i>Balistes melanophlæum</i> Blkr.
Scomberoidei. <i>Caranx leptolepis</i> K. H.	<i>Pogonognathus barbatus</i> Blkr.
" <i>pseudopterygius</i> Blkr.	<i>Triacanthus biaculeatus</i> C. V.
Mugiloidei <i>Atherina argyrotaeniata</i> Blkr.	

The species marked thus\* are found in the tables at the head of this contribution. By the 15 species new to the Fauna of Celebes the number of all the species of its fishes is raised to 108, that of the genera to 91, viz. :—

Percoidei.....	13 Genera, 23 Species.
Sparoidei..	5
Chaetodontoidei...	7
Scomberoidei.....	13
Mugiloidei.....	2
Clupeoidei.....	7
Balistini.....	4

leaving the numbers of the remaining families as enumerated in the beginning of this treatise.

Overlooking the species marked\* we find only 4 among those new for Celebes also known in Java, viz: *Therapon theraps* C. V.; *Drepane guttata* C. V.; *Scatophagus argus* C. V.; and *Caranx leptolepis* K. v. H. Thus of the 108 species of fishes known in Celebes 64 are also found in Java.

Celebes most probably has much greater abundance of fishes than Java. Notwithstanding this we know comparatively but a small number of species. I am of opinion that 108 expresses not yet the eighth part of the number of all the species of fishes actually living in Celebes and in its coast waters. There is still to be found a rich treasure for science, not only in ascertain-

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ing the geographic dispersion of the species already known, but also in discovering entirely unknown ones. This would appear to a certain degree from the comparative richness of the collection by M. Zellinger, of which nearly half of the number of species are new in Ichthyology.

A few words only regarding the new genera formed by me; I have named them *Dipterygonotus*, *Apogonoides*, *Amblygaster* and *Pogonognathus*.

The two former belong to the family of the Sparoidei of S. Muller (*Sparoide* and *Maendoles* Cuv. Val.)

The *Dipterygonotus* is distinguished by his snout prolonged into a horizontal tube, by two diverging fins without scales, toothless gill covers, a small flat thorn at the operculum, scaled joles and absence of jaw bone and erect teeth.

*Apogonoides* thus named by me from its resemblance in habitat to divers sorts of *Apogon*, has likewise two diverging dorsal fins and toothless gill covers, but no thorn at the operculum, the snout but little prolonged, small bristly jaw teeth and erect and canine teeth.

The 3rd of the genera formed by me belongs to the Clupeoidei, and has a great affinity to the genus *Clupea*, from which it is chiefly distinguished by a flat round smooth belly, a character which I tried to express by the word *Amblygaster*. *Amblygaster* has a long compressed body, a round unspiked belly, 5 rayed gills, the eyes partly closed by a membrane, a naked head, no teeth.

With regard to the novelty of the genus belonging to the Balistini, called *Pogonognathus*, I am not quite certain. Remote from every centre of science, confined altogether to my own library and not in possession of some Ichthyographic works, I cannot positively decide whether the *Aluteres cryptacautus* Cuv. (Renard II part p. I 2f. 284) or the *Anacanthus barbatus*, Gray, illustrated in the Ind. Zool. Vol. I. Tab. 84 f. 2, be identical or related to my *Pogonognathus barbatus*. The *Alutera barbata*, mentioned by S. Muller in his above mentioned treatise, is there only enumerated without being described, so that I am likewise uncertain with regard to that species, whether it is the same with that discovered by me. I am inclined however to identify both of them, since they were found at the same spot, and I know of no species of *Aluteres*, with one or more cirri in the underjaw. It must be reserved to zoologists, who can command a greater share of literary aid than I, on this unscientific spot of the earth, to remove the uncertainty on the point. *Pogonognathus* is nearly related to *Aluteres*, but is distinguished from the latter by a large membranous cirrus on the chap, and a single dorsal fin formed merely by a bony fibre. The characteristic marks of the *Pogonognathus* are a long compressed body covered with a short downy hair,

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a thin bony fibre instead of a dorsal fin, a thick membranous feeler at the chin, the bones of the pelvis concealed under the skin;—the pelvis of the males projecting.

I shall now enter into a short description of the new species. I have added the diagnosis of a kind of *Caranx* which I consider to be the *Caranx leptolepis* K. v. H., also that of the East Indian Sailor [*Oostindisch vaarder*] mentioned by Valentyn, called by me *Balistes melanopleua*.

### *Speciarum Diagnoses.*

#### *Percoidei.*

(755) *Holocentrum leonoides*, Blkr.

Hol. linea fronto-dorsali convexiuscula, spinis opercularibus inequalibus, preoperculari longa bisulcata, operculi limbum posteriorem multo superante; dentibus suborbitalibus 2 majoribus; lateribus verticis striis 6-7 divergentibus; spinis dorsi crassis pinna caudali profunde biloba lobis rotundatis; colore corporis pinnarumque argentes rubro, fasciis et maculis nullis.

D. 11—I/14, P. I/12, VI/7, A. 3/10, C. 19 et lat brev.

Habit. Macassar Mare.

#### *Sparoidei.*

(756) *Dipterygonotus* Blkr.

Dentes maxillares, vomerini et palatini nulli. Ossa opercularia non dentata, operculo spina unica plana. Os in tubum horizontalem protactile. Pinnæ dorsales duæ distantes, non squamatae. Genæ squamatae. Membrana branchiostega radiis 7.

(757) *Dipterygonotus leucogrammicus*. Blkr.

Dipt. conore elongato compresso, altitudine  $5\frac{1}{2}$  in ejus longitudine, capite 5 in corporis longitudine, linea laterali recta; pinna dorsales spinosam inter et radiosam spinis humilibus liberis 4; squamis parvis ciliatis; pinna angulatis, caudali propende incisa; colore verticis et dorsi coeruleo, vittis longitudinalibus albis 3, laterum ventris que argenteo, pinnarum flavescens hyalino.

B 7. D. 10-4-1/9, P. 1/13, V. 1/5, A. 3/10, C. 17 et later. brev.

Hab. Macassar Mare.

Species habitu corporis *Cæsiotile* Cuv. Val. affinis.

(758) *Apogonoides* Blkr.

Dentes maxillares setacei, palatini et vomerini nulli Ossa opercularium non dentata, operculo spina nulla Os parum protractile. Pinnæ dorsi 2 distantes, non squamatae membrana branchiostega radiis 6.

(759) *Apogonoides macassariensis* Blkr.

Ap. corpore oblongo compresso altitudine  $4\frac{1}{2}$  circiter in ejus longitudine, capite 4 in corporis longitudine, pinna caudali biloba.

B. 6, D. 6—1/9. P. 11, V. 1/5, A. 2/11, C. 16.

Hab. Macassar Mare.

Species habitu *Apogon glaga* Blkr. affinis



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*Specimina 7 minus bene conservata colores nec viscera monstrant.*

### *Scomberoidei.*

(760) *Caranx pseudopterygins* Blkr.

Car. pinnis dorsalibus 3 posteriore spuria; corpore elongato, altitudine 5 in ejus longitudine; capite 4 in longitudine corporis, line fronto dorsal fere recta; dentibus minimis; maxilla inferiore superiore longiore; prae-operculo rectangulo rotundato; membranae oculi adiposae parte posteriore lata; linea laterali parte posteriore tantum armata, scutis latis p. m. 30, dentatis, pinna pectorali 5 in longitudine corporis; colore corporis supra caerulescente infra argenteo, pinnarum omnium flavescente, maculis nigris nullis.

D. 1 procumbens 8— $1\frac{1}{32}$ —1, P. 2/20, V.  $1\frac{1}{5}$ , A. 2— $1\frac{1}{27}$ , C. 18 et lat. brev.

Hab. Macassar Mare.

Species *Caranx kiliche* C. V. et *Caranx kurra* C. V. affinis sed proportionibus numeroque radiorum distincta.

(761) *Caranx leptolepis* K. v. H. Cuv. Val. Hist. Pois./IX. P. 48.

Car. pinnis dorsalibus 2, corpore elongato humili, altitudine  $3\frac{1}{2}$  ad 4 in ejus longitudine; capite  $4\frac{1}{2}$  in longitudine corporis, linea fronto-dorsali leviter convexa, dentibus fere inconspicuis; praeoperculo rectangulo rotundato, linea laterali usque ad mediam pinnam dorsi radiorum flexuosa, in portico, ejus parte tantum scutata, scutis parvis vix dentatis; thorace squamato; pinna pectorali 4 in longitudine corporis; colore supra caerulescente infra argenteo, macula operculo humerali nigra, pinnarum omnium flavescente.

D. 1 procumbens 8- $1\frac{1}{26}$ , p. 2/17, V.  $1\frac{1}{5}$  A. 2- $1\frac{1}{22}$ , C. 17 et lat. brev.

Hab. Macassar Mare.

### *Mugiloidei.*

(762) *Atherina argyrotaeniata* Blkr.

Ath. corpore elongato cylindrico, altitudine  $6\frac{1}{2}$  in ejus longitudine, antice aequae crasso ac alto, capite  $4\frac{1}{2}$  in longitudine corporis, fronte convexa vertice plano; oculis  $2\frac{1}{2}$  in capitis longitudine; ore de livo, praeoperculi margine postico excise; nonnullis poris lacunosus ad latera capitis sub oculis et maxilla inferiore; squamis magnis; linea laterali paulum conspicua; marginibus pinnarum dorsalis secundae et analis superioribus excavatis; pinna dorsali secunda medius fere interpinuas ventrales et analem; pinna pectorali  $5\frac{1}{2}$  in longitudine corporis; colore corporis dorso viridescente, ventre ex roseo argenteo, lateribus vitta lata nitente argentia, supra limbo caeruleo; pinnis hyalinis; iride marginem superiorem versus macula nigra.

D. 6- $1\frac{1}{9}$  vel.  $1\frac{1}{10}$ , P.  $1\frac{1}{14}$ , V.  $1\frac{1}{5}$ , A.  $1\frac{1}{10}$ , C. 15 et lat. brev.

Hab. Macassar Mare.

Species *Atherina Forskaeli*, Rupp. affinis sed forma capitis, numero radiorum analium etc. distincta.

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### *Clupeoidei.*

(763) *Clupea macassariensis* Blkr.

Clup. corpore elongato compresso, altitudine 7 in ejus longitudine, capite acuto  $4\frac{1}{2}$  in corporis longitudine; ore antico edentule; squamis magnis; linea laterali recta; ventre paulum carinato; pinna dorsali medio dorso posita; colore dorso caeruleo, lateribus et ventre argenteo, basi caudal striis 4 caeruleis longitudinalibus.

D. 2/9, P.  $1\frac{1}{11}$ , V.  $1\frac{1}{7}$ , A.  $1\frac{1}{8}$ , C. 18 et lat. brev.

Hab. Macassar Mare.

(764) *Clupea argyrotaeniata* Blkr.

Clup. corpore elongato compresso, altitudine 7 in ejus longitudine capite acuto 5 in corporis longitudine; ore antico edentulo; squamis magnis; linea laterali inconspicua; ventre paulum carinato; pinna dorsali medio corpore posita; colore ex flavescente hyalino, vitta laterali nitente argentea lata.

D.  $1\frac{1}{9}$  P.  $1\frac{1}{15}$  v.  $1\frac{1}{7}$ , A.  $1\frac{1}{12}$ , vel.  $1\frac{1}{13}$ , C. 18 et later. brev.

Hab. Macassar Mare.

(765) *Clupea gibbosa* Blkr.

Clup. corpore elongato compresso  $4\frac{1}{2}$  in ejus longitudine, dorso medio in gibbam elevato; capite 5 in longitudine corporis; ore antico edentulo, ventre valde carinato serrato; pinnis, dorsali postice an. anteriore corporis parte sita, subquadrata radio penultimo paulum longiore; ventralibus analique parvis, squamis mediocribus striatis; linea laterali conspicua; colore corporis dorso caeruleo, lateribus ventrequae flavescente argenteo, pinnis flavescente.

D. 2/15 P.  $1\frac{1}{15}$ , v.  $1\frac{1}{7}$ , A.  $1\frac{1}{20}$ , C. 19.

Hab. Macassar Mare.

(766) *Amblygaster* Blkr.

Ossa intermaxillaria parva; maxillaria os maxima parte constituentia, corpus elongatum compressum, ventre obtuso rotundato non serrato. Dentes nulli. Caput supra nudum oculi membrana semilecti. Genae venosae.

Membrana branchiostegaradus 5.

(767) *Amblygaster Clupeoides* Blkr.

Ambly. corpore elongato paulum compresso, altitudine 5 in ejus longitudine; capite 5 fere in corporis longitudine, ore antico, aculo  $3\frac{1}{2}$  in capitis longitudine; squamis magnis; pinnis acutis, dorsali triangulari, ventrali opposita, altitudine  $8\frac{1}{2}$  in corporis longitudine; ventralibus brevibus, squamis elongatis ad earum bases; anali humili,—colore corporis dorso caeruleo, lateribus ventrequae flavescente argenteo, rostro nigro; pinnis flavescente, pectoralibus rabus anterioribus postice fuscis.

B 5, D.  $3\frac{1}{15}$ , p.  $1\frac{1}{16}$ , v.  $1\frac{1}{7}$ , A.  $1\frac{1}{16}$ , vel.  $1\frac{1}{17}$ , C. 17 et later. brev.

Hab. Macassar Mare.

(768) *Engraulis Zollingeri* Blkr.

Engr. corpore elongato compresso, altitudine  $6\frac{1}{2}$  in ejus longitudine, capite  $4\frac{1}{2}$  in longitudine corporis, rostro prominente; rictu amplissimo;

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ossibus maxillaribus servatis; ventrie inter pinnis pectorales, et ventrales cultrato; linea laterali nulla; squamis deciduis: supra pinnae pectorales squame magna acuminata; pinnis, dorsali pinnae ventrales inter et analem posita, caudali utroque latere lobis 2 membranaceis; colore corporis viride hyalino, vitta longitudinali lata argentea, pinnarum flavese cente.

D. 2/11, P. 1/12, V. 7, A. 17, C. 19.

Hab. Macassar Mare.

Species *Eugraulis heteroloba* Rupp. affinis, sed positione pinnae dorsalis numeroque radiorum distincta.

*Balistini.*

(769) *Balistes melanopleura*. Blkr.

Bal. corpore subparallelo grammico compresso, basi caudae seriebus tribus aculeorum armata, serie superiore aculeis 2 vel 3, inferioribus aculeis 10-12; pinnis, caudalit runcata, pectoralibus, dorsali analique rotundatis; linea laterali flexuosa; colore corporis supra profunde viridi, infra flavo, vittis 3 pectorali frontalibus caeruleis, macula nigrescente magna supra anum; colore pinnarum rosaceo flavescente, dorsalis analisque basi violaceo, vittis 2 caeruleis longitudinalibus.

D. 3-3/23, P. 1/12, A. 2/21, C. 12.

Syn. Oostindischyaarder. Valentyn. *Ind. Amb.* III. p. 400 fig. 173.

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(770) *Pogonognathus* Blkr.

Corpus elongatum valde compressum villosiusculum pinnae dorsalis primae loco filum osseum tenue unicum ossa pelvis sub cute occulta Maxilla inferior cirro carnosio unico magno. Dentes in singulis maxillis 4 acuti Mas pelvi producta.

(771) *Pogonognathus barbatus* Blkr.

Pog. corpore elongato, maxime compresso, altitudine, 12 in ejus longitudine, rostro maxime elongato; cirro inframaxillari dimidiam rostri longitudinem aequante; linea laterali flexuosa; pinnis, caudali excepta, radiis simplicibus dorsali anali humiliore, caudali longa acuta  $2\frac{1}{2}$  in corporis totius longitudine; colore capite, corpore rinnisque pectoralibus fusco, dorsali analique rufo, caudali fusco nigro maculato.

D. 1 filiformis—49, P. 10, A. 57, C. 12.

Syn. *Aluthera barbata*, S. Mull. 1. cit.

Hab. Macassar Mare.

Dr. P. BLEEKER.

SOERABAYA, 10th July 1849.—*Jour. of the Ind. Archi.* Vol. III. No. 1, January 1849, pages from 65 to 74.

*A Contribution to the knowledge of the Ichthyological Fauna of Sumbawa.*

BY DR. BLEEKER.

Chir. Maj. Besturend Liden Secretaris v. h. Bat. Gen. v. k. en. W., Lid v. h. Amsterd. Genees en Heelk. Gen. v. d. Maatsh. v. Nederl. Letterk. te Leiden, v. h. Naturk. Gen. te Groningen, &c. &c.

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The meritorious naturalist traveller H. Zollinger, had the goodness, during his residence at Bima on the island of Sumbawa, to collect for me a great many kinds of fishes. To the collection thus brought together by that learned person, this account is indebted for its origin.

Sumbawa was until this time totally unknown in an ichthyological point of view. Science is thus under new obligations to my friend Zollinger. The natural history of Netherland's India expected from him yet greater advances, but peculiar circumstances caused his return to Europe: the sense of his merits and my esteem and friendship for him, induce me to dedicate to him one of the yet undescribed species of fishes which he collected.

The fishes enumerated below were all taken in the sea at Bima. They naturally form but a small portion of the Ichthyological Fauna of Sumbawa. As a first contribution to the knowledge of this Fauna what follows will not be without value.

The species of the collection are 47 in number and belong to 35 genera and 19 families. They are as follows:—

Percoidei.....	* <i>Lates nobilis</i> C. V.
	* <i>Therapon servus</i> , C. V.
	<i>Ambassis nalu</i> C. V.
	<i>Apogonmul titaenia-</i>
	<i>tus</i> Ehr. C. V.
	„ <i>melas</i> Blkr.
	* „ <i>thermalis</i> C. V.
	* <i>Serranus crapae</i> C. V.
	* „ <i>pardalis</i> Blkr.
	<i>Mesoprion erythrop-</i>
	<i>terus</i> C. V.
	<i>Holocentrum sam-</i>
	<i>mara</i> C. V.
	* <i>Sillago acuta</i> C. V.
Scleroparei... ..	* <i>Pterois volitans</i> C. V.
	<i>Apistus Zollingeri</i>
	Blkr.
Sciaenoidei... ..	* <i>Pristipoma kaakan</i>
	C. V.
	* <i>Scolopsides lycogenis</i>
	C. V.
	<i>Heterognathodon bifa-</i>
	<i>sciatus</i> Blkr.
Sparoidei... ..	* <i>Chrysophrys cala-</i>
	<i>mara</i> C. V.
	* <i>Caesio erythrogaster</i>
	C. V.
Chaetodontoidei ... ..	<i>Chaetodon vagabun-</i>
	<i>dus</i> C. V.
	„ <i>sebæ</i> C. V.
	* „ <i>octofasciatus</i>
	C. V.
	* <i>Hniochus macrolepi-</i>
	<i>dotus</i> C. V.
	* <i>Platax Leschenaldi</i>
	C. V.
	* <i>Toxotes jaculator</i> C.
	V.



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Scomberoidei,.....	* <i>Caranx xanthopygus</i> C. V.
	* <i>Equula caballa</i> C. V.
Theutides,.....	<i>Amphacanthus margaritiferus</i> C. V.
Mugiloidei,.....	* <i>Mugil Dussumieri</i> C. V.
	<i>Atherina bimanensis</i> Blkr.
Gobioidei,.....	<i>Gobius quinquethigatus</i> C. V.
	„ <i>erythrophaios</i> Blkr.
Labroidei Ctenoidei,...	<i>Pomacentrus vanicolensis</i> C. V.
	* <i>Pomacentrus fasciatus</i> C. V.
	<i>Pristotis trifasciatus</i> Blkr.
	<i>Pristotis violascens</i> Blkr.
	<i>Dascyllus aruanus</i> C. V.
	* <i>Glyphisodon bengalensis</i> C. V.
	<i>Heliases lepisurus</i> C. V.
Labroidei Cycloidei,...	* <i>Julis (Halichoeres) modestus</i> Blkr.
	<i>Scarus sumbawensis</i> Blkr.
Clupeoidei,.....	<i>Alosa brevis</i> Blkr.
Aulostomato,.....	<i>Amphisile scutatus</i> Cuv.
Gymnodonta,.....	<i>Tetraodon papua</i> Blkr.
Balistini,.....	* <i>Balistes aculeatus</i> Bloch. Cuv.
	<i>Aleuterus lævis</i> Cuv.
Ostraciones,.....	<i>Ostracion cubicus</i> Block Cuv.
	<i>Ostracion valentini</i> Blkr.

Of the 47 species, the 21 marked with \* belong to the Fauna of Java, being thus about one half; 10 are new to science; the rest doubtful.

One species I have considered it necessary to place in a new genus, which I had previously established in 1844, but of which I have not yet published the characters. It is a genus of *Sciænoïedes*, which, related to the *Scolopsides*, is chiefly distinguished from them by the presence of 4 tusks in the upper and two in the under jaw, as well as by the non-thorned or thorn formed extremities of the os suborbibale. In my Contributions to the Medical Topography of Batavia I have named the first species of the genus discovered by me, *Heterodon zonatus*, which name I afterwards changed into *Heterognathodon xanthopleura*, as more descriptive of the genus and species. *Heterognathodon bifasciatus* of Bima is the second species belonging to this new genus,

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but I believe it is the same species as *Scolopside caninus* Cuv. Val. which is given in the celebrated *Historie Naturelle des Poissons* at the end of the list of the species of *Scolopsides*.

Of some of the species already known to science, I have drawn up new diagnoses, even as I have done of some doubtful species. I must still lament that, from my unavoidable separation from the scientific world, I am not in a condition to lithograph the new species. I must await my return to Europe to publish my already partly completed *Fauna Archipelagi Indici Ichthyologica*. The efforts made by me with the government of Netherland's India for its publication have not only not been attended with the desired result, but, followed by a transference from Batavia to Samarang and Surabayá, have placed me even beyond the possibility of applying to the service of ichthyological science my cabinet, collected by the labours of many years and at great cost. Batavia, but a short time past the centre of science in Netherland's India, shall speedily be so no more. The scientific periodicals, the *Tijdschrift voor Neerlandisch Indie*, the *Natuur en Geneeskundig Archief voor Netherlandisch Indie*, the *Indisch Magazyn*, on whose existence these possessions might pride themselves, have all fallen to the ground. The year 1848 will be noted in the history of the Netherland's India as the last year of the decennium of its scientific activity. May the time come when science shall be again protected and supported here against the unfavourable influences which, in the midst of her bloom, have by little and little undermined and menaced her with total destruction.

I have allowed myself the preceding digression in order to shew why my ichthyological publications are not yet more numerous, and why they are not accompanied by plates of the species discovered by me.

I shall proceed to the diagnostical description of the doubtful, less known, and new species.

### *Percoidei.*

(772) *Apogon melas* Blkr.

Ap. corpore oblongo compresso, dorso elevato, altitudine corporis  $3\frac{1}{2}$  in ejus longitudine; capite æque longo ac corpore alto; linea rostro-dorsali rectiuscula; pinnis dorsali 2a rotundata, caudali margine posteriore concava; colore capite corpore pinnisque omnibus nigro.

D. 8.— $1\frac{1}{8}$  p  $2\frac{1}{2}$  v.  $1\frac{1}{5}$  A.  $2\frac{2}{9}$  C. 17.

Hab. Bima Mare.

(773) *Apogon multitæniatus* Ehr. C. Val. *Hist. Poiss.* II. p. 118?

Ap. corpore oblongo compresso; dorso elevato; altitudine corporis  $3\frac{3}{4}$  in ejus longitudine; capite æque longo ac corpore alto; linea rostro-dorsali leviter convexa; pinnis dorsali 2a rotundata, caudali postice excisa; colore corpore purpurascens, fasciis 10-13 longitudinalibus fuscis, pinnis dorsalibus violaceo ceteris rufis.

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D. 7.—1/10 p. 1/12 V. 1/5 A. 2/9 C. 17 et later.

Hab. Bima Mare.

(774) *Apogon thermalis* Cuv. Val. Hist. Poiss. 111. p. 363 ?

Ap. corpore oblongo compresso, dorso elevato, altitudine corporis  $3\frac{1}{4}$  ad  $3\frac{1}{2}$  in ejus longitudine; capite æque longo ac corpore alto; linea rostro-dorsali infra concava, supra convêxâ; pinnis dorsali 2a rotundata, caudali leviter excisa lobis latis; colore capite, corpore pinnisque flavescente hyalino, membrana spinam dorsalem 2 m. inter et 3 m. nigro, cauda latere macula rotunda nigra.

D. 6—1/10 p. 2/12 V. 1/5 A. 2—9 C. 17 et later.

Hab. Bima Mare.

(775) *Serranus pardalis* Blkr.

Serr. corpore elongato compresso, altitudine 4 in ejus longitudine, capite obtuso  $3\frac{1}{2}$  in corporis longitudine; fronte humili, linea frontali convexa; dentibus caninis in maxilla superiore 2; praeoperculo angulato, parte inferiore marginis, Posterioris dentibus aliquot superioribus majoribus; spinis opercularibus crassis 3; oculo diametro 4 in longitudine capitis; squamis parvis; pinnis rotundatis, caudali integra postice convexa, pectoralibus 4 in longitudine corporis; colore corpore pinnisque rufescente, maculis fuscis magnis, fere contiguis, dorso hexagonis, lateribus ventroque pinnisque omnibus rotundatis; pinna pectorali basi fasciis 2 fuscis apice nigrescente.

D. 11/18. p. 2/15 v. 1/5 A. 3/9 C. 17.

Hab. Bima Batavia, Mare.

Species *Serranus faveatus* C. Val. l. c. II. p. 245 maxime affinis, sed numero radiorum distincta

(776) *Mesoprion erythropterus* C. V. l. c. II. p. 362.

Mes. corpore oblongo elevato, altitudine  $3\frac{1}{2}$  in ejus longitudine; capite aculo 3 in longitudine corporis; linea rostro frontali recta; dentibus caninis 2 maxilla superiore, dentibus pluribus majoribus in maxilla inferiore; osse suborbitali humiliore; praeoperculo margine posteriore leviter exciso; oculo diametro  $3\frac{1}{2}$  in capitis longitudine; pinnis dorsali et anali rotundatis, caudali integra angulata postici convexa; colore supra purpurascens infra flavescens maculis basibus squamarum obscurioribus, pinnis purpurascens.

D. 11./14 A. 3/9 p. 2/14 v. 1/5 C. 17 et later.

Syn. *Lutjanus erythropterus* Bloch. pl. 249.

Hab. Bima Mare.

(777) *Holocentrum sammara* C. V. l. c. III. p. 161.

Hol. corpore oblongo compresso, altitudine 4 fere in ejus longitudine, capite acuto  $3\frac{1}{2}$  in longitudine corporis; lineis rostradorsali convexa, intramaxillari ventrali recta; dentibus orbitalibus et opercularibus numerosis, suborbitalibus magnis; spinis opercularibus inaequalibus praeoperculati mediocri, limbum V IX superante; oculo magno  $2\frac{1}{2}$  in longitudine capitis; lateribus

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verticis striis 8-10 divergentibus; spinis aoris mediocribus; pinna caudali profunde divisa lobis rotundatis; colore dorso violascente, lateribus ventroque ex roseo argenteo, vittis longitudinalibus fuscis 8-10; pinnis pectoralibus, anali et caudali ex rosacea flavescens, ventralibus albo; macula nigra magna spinas dorsales lin inter et 4 in; pinnis dorsali et anali radios marginis inferiore, caudali lateribus violaceo; genis argenteo, guttis pluribus nigris; operculis nigrescente.

D. 10—1/12 p. 1/13, V. 1/7, A. 4/9, C. 19, et later brev.

Syn. Schouwerdick Renard Poiss. J. f. 156. ?

*Sciaena sammara* Forsk. ?

*Labrus angulosus* Lacep. Poiss. III, p. 4. 30.

*Holocentrum Samara* Rupp. Fisch d. roth.

Meers. pl. 22 f. 3 ?

*Holocentrum Christianum* Ehr. C. Poiss III, p. 162 ?

Hab Bima Mare.

Diagnosis amplior propter speciei incertitudinem.

*Scleroparei.*

(778) *Apistus Zollingeri* Blkr.

Ap. corpore oblongo, altitudine  $3\frac{1}{4}$  in ejus longitudine, capite  $3\frac{1}{2}$  in longitudine corporis; spinis suborbitalibus 2, praeopercularibus 4, cirris nullis; squamis fere conspicuis; radio pectorali libro nullo; pinna dorsali spinosa in 2 partes divisa, parte anterior trispinosa, paulum post oculos incipiente, pinna caudali integra postice convexa; colore corpore pinnisque fusco nigro nebulato et variegato.

D. 14/7, p. 1/11. V. 1/5, A. 3/6. C. 12.

Hab. Bima Mare.

Species habitu *Apistus trachinoides* C. V. affinis sed sat distinctior. Nomen dedi in honorem amicissimi Henrici Zollingeri, naturae tropicae indefessi perscrutatoris.

*Sciaenoides.*

(779) *Heterognathodon* Blkr.

Pinna dorsi unica. Membrana branchiostega radiis 5. Pinna pectoralis radiis fissis. Ossa suborbitalia glabra. Præoperculum dentatum. Dentes maxillares superiores setacei, pluriseriati caninis anticis 4; inferiores anticis setacei pluriseriati, caninis 2 curvatis, postici conici uniseriati.

Syn. *Heterodon* Blkr. Bydr. td. geneesk. Topograph. V. Batavia.

(780) *Heterognathodon bifasciatus*, Blkr.

Het. corpore oblongo compresso altitudine 5 in ejus longitudine; capite 4 in longitudine corporis, rostro convexo; ossibus suborbitalibus edentulis; praeoperculo rotundato; pinna operculari plana unica brevi ossibus maxillaribus superioribus denticulatis; pinna caudali postice concava; colore dorso lateribusque caeruleo, vittis 2 longitudinalibus margaritaceis, 1a oculum inter et radio dorsali postico, 2a rostrum inter et basin pinnae caudalis; ventre pinnisque flavo.

D. 10/10, p. 1/14, V. 1/5, A. 3/7 C. 17.



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*Syn. Scolopsides caninus* C. V. I. c. v. p. 266 ?

Hab. Bima Mare.

*Mugiloidei.*

(781) *Mugil Dussumieri* C. V. I. c. X. I. p. 109 ?

Mug. corpore gracili compresso; linea rostro dorsali obliqua subrecta; capite acuto aequae alto ac longo, 5 in longitudine corporis; latitudine capitis  $1\frac{1}{2}$  in ejus longitudine, oculis diametro 4 in capitis longitudine, velo adiposo orbitali oculos non tegente; rostro acuta, maxilla superiore inferiore longiore; ossibus suborbitalibus dentatis; labio superiore mediocri non cirrato; pinnis dorsali 1a spinis validis, 2a et anali angulatis, corpore multo humilioribus, radiis non productis; pinnis pectoralibus capite brevioribus, 7 in longitudine totius corporis; caudali margine posteriore leviter concava; appendice pinnæ dorsales squamosa longa; squamis mediocribus carinatis, carinis singulis seriebus squamarum longitudinalibus contiguis, lineas longitudinales parallelas 8 vel 9 constituentibus; colore corpore ex flavesciente argenteo, pinnis flavescente.

D. 4—1/8, p. 1/13, v. 1/5, A. 3/9, C. 14 et brev.

Hab. Bima Mare.

(782) *Atherina bimanensis* Blkr.

Ath. corpore elongato compresso altitudine  $6\frac{1}{2}$  in ejus longitudine; capite compresso 4 in longitudine corporis, fronte obliqua, oculis diametro  $2\frac{1}{2}$  in longitudine capitis; præoperculo margine posteriore exciso; squamis magnis; pinna pectorali 5 in longitudine corporis, acuminata; pinna dorsali 1a medio pinnas ventrales inter et analem; colore corpore ex flavesciente argenteo, guttis lateribus pluribus nigris, serialis; pinnis flavescente, basi pinnæ pectoralis stria nigra.

D. 5—1/7, p. 1/13, v. 1/5, A. 1/9, C. 14 et later.

Hab. Bima Mare.

*Gobioidei.*

(783) *Gobius erythrophaios* Blkr. Diagn. vide in conspect. Gobioideorum Archip. Sunda—Molucc.

*Labroidei Ctenoidei.*

*Pristotis* Rupp. Neve wirbeltk. Fisch roth. M. p. 128.

(784) *Pristotis violascens* Blkr.

Prist. corpore oblongo compresso, altitudine  $3\frac{1}{2}$  in ejus longitudine dorso et ventre convexis; capite  $4\frac{1}{2}$  in longitudine corporis; præoperculo subrectangulo; pinnis dorsali an alicue rotundatis, caudali margine posteriore concava; angulis rotundata colore corpore violascente, pinnis pectoralibus ventralibusque dilutioribus, macula nigra ad basin pinnæ pectoralis.

D. 13/II, p. 2/16, V. I/5, A. 2/II, C. 17 et later.

Hab. Bima Mare.

(785) *Pristotis trifasciatus* Blkr.

Prist. corpore oblongo compresso, altitudine  $3\frac{1}{2}$  in ejus longitudine; dorso convexo, ventre

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subrecto; capite  $4\frac{1}{2}$  in longitudine corporis; præoperculo subrectangulo; pinnis pectorali radio primo in filum producto, dorsali analique acutis, caudali biloba, radiis 2 productis; colore corpore viridescente, vittis 3 nigris latis verticalibus, 1a oculari, 2a spinas dorsales anteriores inter et pinnas pectorales, 3a in parte posteriore pinnæ dorsalis spinosae et parte anteriore pinnæ dorsalis radiosae.

D. 13/10, p. 1/14, V. 1/5, A. 2/12, C. 17 et later.

Hab. Bima Mare.

*Labroidei Cycloidei.*

*Julis* (Halichoeres) modestus Blkr overz. Batav. Gladschubb, Labroid, p. 26 var. Pinnis omnibus aurantiacis, dorsali analique maculis numerosis rubris.

Hab. Bima Mare.

(786) *Scarus sumbawensis* Blkr.

Scar. corpore oblongo compresso, altitudine  $3\frac{1}{2}$  in ejus longitudine, capite obtusiusculo, 4 fere in longitudine corporis; fronte convexa non prominente; maxillis roseis denudatis glabris leviter crenulatis, dentibus angularibus nullis; linea laterali ramosa; pinna caudali margine posteriore convexa, radiis externis prominentibus; colore corpore viridi, capite dorsoque profundiore, marginibus squamarum rubro, fasciis capite lateribusque nullis; pinnis pectoralibus et ventralibus aurantiaco, dorsali analique rubescente violaceo marginato, caudali violaceo.

D. 9/4, p. 1/13, V. 1/5, A. 3/10, C. 13, et later.

Hab. Bima Mare.

*Clupeoidei.*

(787) *Alosa brevis* Blkr.

Al. corpore oblongo, compresso; altitudine 3 fere in ejus longitudine; capite 4 in longitudine corporis, ore edentulo; maxilla superiore inferiore longiore; oculo diametro 8 in capitis longitudine, dorso ventreque convexis, ventre cultrato spinoso, pinna caudali non squamosa, profunde excisa, colore dorso coeruleo, lateribus ventreque flavescente argenteo, pinnis flavo.

B. 5, D. 1/17, p. 1/16, V. 1/17, A. 1/17, C. 19 et lat.

Hab. Bima Mare.

Species habitu *Clupanodonchanpole* Ham. Buch, affinis.

*Gymnodonta.*

(788) *Tetraodon papua* Blkr.

Tetr. corpore irregulari oblongo, compresso, altitudine  $2\frac{2}{3}$  in ejus longitudine, dorso et ventre scabris, lateribus et cauda laevibus, capite acuto, rostro prominente, naribus in papillo concavo 2 minimis, fere inconspicuis, linea laterali inconspicua, pinnis dorsali analique rotundatis, pectorali emarginata, caudali postice convexa 4 in longitudine corporis, colore corpore supra profunde fusco, guttis coeruleis, radiis coeruleis circa oculos infra rubro, pinnis rosaceo, flavescente, macula nigra magna, coeruleo limbata sub et ad

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basin pinnæ dorsalis guttis plurimis coerulescentibus ad pinnam caudalem.

D. 9., p. 16, A. 8, C. 9, et lat. brev.

Syn. Ikan Papoea d'jantan. Valentyn. Ind. Am. III. p. 249.

Hab. Bima Mare.

*Balistini.* \*

(789) *Balistes aculeatus* Bloch Tab. 149.

Bal. corpore ovali compresso, basi caudæ seriebus 3 aculeorum armata, serie superiore aculeis 9—11, serie inferiore duplo brevior aculeis 4—5; pinnis caudali postice leviter convexa, pectoralibus, dorsali analique rotundatis; linea laterali inconspicua; colore dorso viridi fuscescente ventre flavescente, vittis oculari-pectoralibus 3 coeruleis maxillari-pectoralibus 2, superiore triangulari aurantiaco, inferiore margaritaceo, lateribus supropinnas pectorales fusco fasciis 4 obliquis ad anum, nigro cinctum, et ad pinnam analem descendentes, pinnis dorsali la fusco, ceteris aurantiaco, labiis flavescente, superiore coeruleo limbata.

D. 3—3/21, p. 1/12, A. 2/20, C. 12.

Syn. Soenoeck. Renard. Poiss. I. f. 154.

*Baliste epineux* Lacep. I. Tab. 17 f. I.

*Balistes aculeatus* Cuv: Regne An. ed luxe, nec Ruppel.

*Balistes aculeatus* Ruppel (Neve Wirbelth. visch. roth. M. p. 27. Tab. 7 fig. I.) species affinis sed numero radiorum, seriebus aculeorum, caudalium, coloribusque sat distincto.

(790) *Aleuteres laevis* Cuv.

Al. corpore oblongo compresso altitudine, 4 in ejus longitudine linea frontali concava, dentibus in singulis maxillis 4, pinna caudali longissima rotundata  $3\frac{1}{2}$  ad  $3\frac{1}{4}$  in longitudine totius corporis, radiis pinnarum, caudali excepta, simplicibus, colore corpore rufo viridi maculis sparsis, labiis nigro, genis pectoreque vittis longitudinalibus coeruleis pinnis dorsali pectoralibus, analique fuscescente pellucido, caudali nigrescente radiis fuscis.

D. 1/44, p. 14, A. 49, C. I/10/1.

Syn. *Balistes laevis* Bloch. Tab.

Hab. Bima Mare.

*Ostraciones.*

(791) *Ostracion cubicus* L. Bloch. Tab. 137. Cuv. Rupp.

Ostr. corpore tetrangolo, altitudine pyxidis osseæ 3 in ejus longitudine spinis frontalibus et analibus nullis, pinnis omnibus rotundatis, linea rostro-frontali concava, scutis granulosis, dorso lateribusque hexagonis, pyxide ventre latiore quam dorso, colore corpore viridi-fuscescente, scutis plurimis dorso lateribusque macula coerulea nigro cincta; pinnis aurantiaco, genis ventre et pinna caudali maculis nigris.

D. 1/8, p. 1/9, A. 1/8, C. 1/7/1.

Syn. *Ostracion mouchete* Lac. I. p. 46 fig.

Hab. Bima Mare.

(792) *Ostracion valentini* Blkr.

Ostrac. corpore tetrangolo, altitudine pyxidis

## FLACOURTIA CATAPHRACTA.

osseæ  $1\frac{1}{2}$  in ejus longitudine, spinis frontalibus et analibus dimidiam pyxidis longitudinem æquantibus; pinna caudali spinis analibus brevior, colore corpore fuscescente maculis profundioribus infra ad latera, ventre roseo, spinis pinnisque omnibus flavescente.

D. I/8, p. 1/9, A. 1/8, c. 1/8/1.

Syn. Ikan Peti, Valentyn Ind. Amb. III. f. 365 l.

Ikan Toetombo badoerie, Valentyn, ib. III. f. 333 ?

Hab. Bima Mare.

Nomen dedi in honorem Francisci Valentini, Indæ orientalis Neerlandicæ olim historiographi meritissimi.

DR. BLEEKER.

SOERABAYA, 21st July 1848.—*Jour. of the Ind. Archipel. Vol II, No. IX, September 1848, pages from 632 to 639.*

(793) FISH OF NEPAUL. The fish in the Nepaul rivers are abundant. The principal kind which inhabits the Raptée, is the sehr, a fish much resembling the roach and greatly esteemed, and the gaoleer. The manner of fishing may be described in a very few words. The channel of the river is intersected by seven or eight casting nets, united together by being hooked at their extremities to poles, or sticks erected in the water for that purpose. To each net there is a man or boy, who has a second net fixed to his waist and hanging behind him, in which he deposits the fish he catches. This he does by diving. The fishermen dive head foremost, though in water not deeper than their middle, throwing up their feet nearly quite erect, and seizing the fish either with their teeth or their hands. After remaining some time at a particular spot, all the nets are dragged together further down the stream, when the fishermen renew their operations. These being over, they draw the casting nets separately; some of which, as well as those round their waists, are often quite full. In the river Tadi, which, augmented by the waters of the Sindoor and Bailhot rivulets, winds round the south point of the Chardi-baisi hill, there are eels of a very large size, and of excellent flavour. The usla, a fish not unlike the British salmon in taste, is also found in the Tadi, and the phaketa abounds in the stream. The phaketa is a small fish, remarkable both for the swiftness with which it glides through the water, and the singular construction of its superior fins, which resemble a fan both in form and in the manner in which they open and close.—*Smith's Nepaul.*

(794) FLACOURTIA CATAPHRACTA.

Puchuala | Panayala.

The fruit is edible. The small leaves and young shoots resemble rhubarb in flavour, and are used as gentle astringents in doses of three scruples. An infusion of the bark in cold water is useful in hoarseness.



## FLOWERS.

(795) **FLACOURTIACEÆ.** *Roumea*, *Poit.* *Roumea Habecarpa*, *Gardn.* A dioecious tree, 16-20 feet high. Rare in the jungles of the Central Province, as at Cundasalle: flowers in June. The only hitherto described species of *Roumea* is a native of St. Domingo, in the West Indies, for the *R. inermis* of De Candolle from Bengal seems to belong to a very different family. The present species is called *Katambilla* by the Cingalese, and the fruit, which is very acid, is used by them in their curries.—*Gardner, Calcutta Journal of Natural History, Vol. VII, pp. 449-50.*

### (796) FLOWERS.

#### USE OF FLOWERS.

God might have made the earth bring forth  
Enough for great and small,  
The oak-tree and the cedar-tree,  
Without a flower at all.

He might have made enough, enough  
For every want of ours;

For luxury, medicine, and toil,  
And yet have made no flowers.

The ore within the mountain-mine  
Requireth none to grow,  
Nor doth it need the lotus flower  
To make the river flow.

The clouds might give abundant rain,  
The nightly dews might fall,  
And the herb that keepeth life in man  
Might yet have drunk them all.

Then wherefore, wherefore were they made

All dyed with rainbow light;  
All fashioned with supremest grace,  
Up-springing day and night;  
Springing in valleys green and low,  
And on the mountains high,  
And in the silent wilderness,

Where no man passes by?

Our outward life required them not.

Then wherefore had they birth?

To minister delight to man

To beautify the earth!

To comfort man, to whisper hope,

Whenever his faith is dim;

For whoso careth for the flowers,

Will much more care for Him:

*Mary Howit.*

#### THE LANGUAGE OF FLOWERS.

In eastern lands they talk in flowers,  
And they tell in a garland their loves and  
cares;

Each blossom that blooms in their garden  
bowers,

On its leaves a mystic language bears.

The rose is a sign of joy and love,

Young blushing love in its earliest dawn;

And the mildness that suits the gentle dove,

From the myrtle's snowy flower is drawn.

Innocence shines in the lily's bell,

Pure as the heart in its native heaven;

Fame's bright star and Glory's swell

By the glossy leaf of the bay are given.

The silent, soft, and humble heart

In the violet's hidden sweetness breathes;

And the tender soul that cannot part,

## FOREST TREES OF WESTERN INDIA.

A twine of evergreen fondly wreathes,  
The cypress that daily shades the grave,  
Is sorrow that mourns her bitter lot,  
And faith that a thousand ills can brave  
Speaks in thy blue leaves forget-me-not.  
Then gather a wreath from the garden bowers,  
And tell the wish of thy heart in flowers.

*Percival.*

(797) **FOONG-HANG, OR CHINESE PHENIX**, a head ornament worn by Chinese ladies composed of gold and jewels, the wings lowering, and the beak of the bird hanging over the forehead on an elastic spring.

(798) **FOOTBALL.** This game is played by Malays in the following manner—the players stand in a circle, larger or smaller according to the number engaged, a ball made of split rattans, hollow and about 6 inches in diameter, is thrown up by one, the person to whom it approaches receives it on the instep of his foot and throws it into the air towards his nearest playmate who in like manner sends it on to the next, and so on: with expert players it is thus sent round from one to another an extraordinary number of times without falling—sometimes one player will himself, particularly when there are many on-lookers, keep the ball in constant motion, receiving it in the fall, now on his foot, now on his knee, elbow, head, shoulder, &c.—*Jour. Ind. Arch. Vol. V. No. 11.* The ball is a perfect sphere, and is so light it may be thrown almost with full force against any fragile object, without injuring the same. The introduction of this plaything into England would be a great matter, in households.

(799) **FOREST TREES OF WESTERN INDIA**, furnishing timbers, by Surgeon Alexander Gibson, F. L. S., 1857.

#### A

1. *Acacia arabica*, *Babool*.—Most common in the interior; less so on the coast, and hardly known in the southern jungles. As every one is acquainted with its uses for wheels, charcoal, &c. these need not be enlarged on here. There are two if not three varieties or species,—*Babool*, *Ram kanta*, and *Free babool*. The first is the most common species; the second less so, and distinguished from the first by its straight stem, and general appearance, resembling that of a gigantic broom. The wood is quite equal to that of the common *Babool*. The third species is distinguishable from the first by its more horizontal mode of branching; the smaller branches long, and stretched out, the side branchicles from them going off at right angles nearly. The bark, also is much more reticulated, broken, and corky than that of the other. The wood is very inferior, as regards its use for agricultural implements, house material, &c. The distinction between the

## FOREST TREES OF WESTERN INDIA.

two should always be kept in view as practically important. The pod of this third species, also, is much broader-margined, and very partially moniliform, and can be at once distinguished from that of the first two species, which is so contracted between each seed as to be nearly severed. The pods and tender branches of all the three species form an important article of food for sheep, goats, and cattle, from February to the beginning of the rains. The flesh of lambs fed on the pods has a flavour equal to that of the best Europe lamb.

2. *Acacia amara*, *Lullye*.—A tree common in the more inland jungles, and dry waste ravines; less so on the coasts. Wood is always very crooked; otherwise it is strong, and might be applicable to domestic purposes. The flower is very beautiful.

3. *Acacia catechu*, *Kheir*.—Is one of the most common trees in the coast and Ghaut jungles. Wood is of great strength and durability. Resists insects; therefore is used for posts and uprights of houses. The extract "catechu" is made from the heart-wood, and is the source of a small revenue in the Konkun. The tax is so much per "hearth," containing about 24 pots.

4. *Acacia Farnesiana*, *Free babool*, *N. B.*—This latter name is also applied to a variety of *Acacia arabica*.—A scrubby shrub, found in waste places, garden hedges, &c. It is not applicable to any other purpose than tent-pegs and firewood.

5. *Acacia leucophlœa*, *Hewur* (?)—I think this species embraces also our *Mimosa tomentosa*,—at least I have never found another to fit the former name. Wood is good, but never of a size for anything beyond posts to small houses.

6. *Acacia odoratissima*, *Sirrus*.—There appears no difference between *Acacia sirrus* and the present species. The white wood, which is always three-fourths of the whole, could probably, by being creosoted, form a useful railway timber. Tree is common both in the coast and interior jungles; often reaches a good size.

7. *Acacia odoratissima*, *Ran sirrus*.—I do not think there is any foundation for a distinction between this tree and the *Acacia serissa*. It is common in our forests, both coast and inland. The heart-wood is strong and excellent, but does not, I think, bear moisture. (Vide above.)

8. *Acacia speciosa*, *Sirrus*.—Vide remark in No. 7. Vide also *Acacia odoratissima*, No. 6.

9. *Acacia Sundra*, *Lal kheir*.—Is common in the inland jungles with us, but is there always scrubby, small, and crooked. It is also found rather plentifully in the forests under the Ghauts, but I have not there seen it of any size capable of affording planks.

10. *Ægle marmelos*, *Bel*.—Tree common in waste places, inland forests, and old gardens. Wood compact and hard, but is not used, more

perhaps from religious feeling than anything else. The beautiful ready-made varnish which surrounds the seeds will one day be turned to use in the arts. The fruit is strongly medicinal.

11. *Ailanthus excelsa*, *Warook*.—This tree is common, chiefly about old buildings, and in raviny ground of the Deccan and Guzerat. It is seldom found as a tree in the forest. I cannot confirm the accounts given by Dr. Wight of its good qualities, neither can I learn that it is ever used in cabinet-work in Bombay; but I give these opinions with diffidence, and in the view of inviting further trials or more information.

12. *Alangium decapetalum*, *Ankool*.—Tree common both in the open country and in some of the jungles, towards the coast, but it is less of a jungle tree than one found in hedges and village lanes. I have never seen one that would give a 10-inch plank. Root has a reputation in snake-bites.

13. *Alstonia scholaris*, *Satreen*.—Grows to be a very large tree in the South Konkun. I have not seen it north of Magotna. It affords excellent boards or thin planks for common purposes, as for pats for children at schools. Hence the name. The bark is valuable in medicine. This tree is not found inland, but appears to grow freely enough in the Botanical Gardens.

14. *Antidesma alexiteria* (?)—A small tree, not common in our forests. Affects rather the skirts of cultivated land. It never reaches a size sufficient to render it fit for purposes of carpentry.

15. *Artocarpus hirsuta*, *Pat funnus*, *Hebul-soo*.—Is not found in our northern jungles; sparingly in those south of the Savitree, to the bounds of Sawunt Warea; after which it is found more plentifully, and continues abundant all down the coast. Wood valuable for canoes, and can bear exposure under water.

16. *Artocarpus integrifolia*, *Funnus*.—Is with us common only about villages. Rare in the North Konkun, but most common south of the Savitree Creek. It is always planted, and often carefully manured. Under these circumstances it attains a great size. I have seen pillars of it in the interior of the buildings of the old forts at Severndroog and Rutnagherry, having 4 feet on each side.

17. *Atalantia monophylla*, *Mahkur limbo*.—Is one of the most common trees in our greenwood jungles or Raes about the Ghauts; less common below and inland. The wood has the qualities ascribed to it by Dr. Wight, but is never procurable in pieces which would square more than four inches.

18. *Azadirachta Indica*, *Neem*.—Found in considerable abundance in most parts of the inland country; more seldom as a forest tree than in waste places. In bare districts, the wood is of great importance for building and agricultural



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purposes. The leaves and bark are also highly medicinal. This is one of the trees which it would be important to increase throughout the country. It reaches a large size even in stony ground.

A B

19. *Balanites Aegyptiaca*, *Hingun bet.*—Tree common in waste places rather than in forests. Wood small, and otherwise worthless, decaying rapidly.

20. *Bassia latifolia* & *B. longifolia*, *Mhowa.*—The first of these is common in all our jungles, both on the coast and above the Ghauts; the latter I have not seen north of the Goa border. The uses of the flower and fruit, being well known, need not be enlarged on here. The wood, particularly the large logs brought from the Barria Forest and Kupperwunje Hills, is extensively used for house and cart purposes in Guzerat, but seldom appears in the market in Bombay or elsewhere. It appears strong and tough.

21. *Bauhinia acuminata*, *Duola kunchun.*—Two species appear to be mixed up here, viz. *Bauhinia albiflora*, which reaches a fair size, and *B. acuminata*, which is a small shrub, of no account as a wood. That of the first species is of good quality, but seldom of scantling sufficient for cabinet and house purposes. The other appears too small to be turned to any purpose of utility. *B. alba* is found in forests on the coast, but rarely. It is more common in the vicinity of villages. *B. acuminata* I have not met with, except as a cultivated species. It seems not to be indigenous with us.

22. *Bauhinia parviflora*, *Apta.*—Wood is reckoned very strong, but is never found of a good size. Bark excellent for ropes. Leaves are extensively used for making "Bherees," or Native cigars. Tree is found throughout our forests, both on the coast and inland.

23. *Bauhinia variegata*, & *B. tomentosa*, *Kunchun.*—The former of these is sparingly found in our forests, and never reaches a size fit for 10-inch plank. Wood is hard and good. *Bauhinia tomentosa* I have never seen in our forests.

24. *Bignonia Indica*, *Tetoo.*—Common near water streams, chiefly below the Ghauts. Wood is of no value, neither does it ever reach any size.

25. *Bignonia quadrilocularis*, *Wurrus.*—Tree found only in the higher hilly places of the Konkun, and about the Ghauts. Flower very beautiful. Wood is reckoned strong and servicable, both for beams and for planks. It is much used as planking for carts.

26. *Bignonia undulata*, *Rukt rora*, *Khew (of Sind).*—This tree is found very rarely in our forests. I have only as yet ascertained its existence in the northern parts of Baglan, in Khandeish; in Sind it is more common in some of the valleys of the Pabb Hills. and at Shah Bilawal. The wood is reckoned very strong and

durable, but, from its size, applicable only to small purposes.

27. *Bignonia xylocarpa*, *Khurseng.*—Common in forests both inland and on the coast. May be easily distinguished by its peculiar rough pods, 2 feet or more in length. The wood is good if ripe. It also affords an oil, obtained by a simple process of reverse distillation, and said to be of great efficacy in cutaneous affections.

28. *Bombax malabaricum*, *Saeer*, *Saeree*, *Kanta saer.*—One of the most common trees in our forests, both of the coast and inland. Reaches a great size. The planks are extensively used in making the light packing-boxes used in the export of bulky goods from Bombay and other places; also for fishermen's floats when the *Adansonia* is not at hand.

29. *Borassus flabelliformis*, *Tar*, *Palmyra.*—Is with us common only in the Northern Konkun, in some parts of which, especially near the sea, it is so abundant that it might be termed forest. The wood, protected from moisture, is very strong and durable, and hence may be used with advantage as roofing for terraces, &c. when the upper covering is complete. It is a rare tree in the southern jungles of the Presidency.

30. *Briedelia spinosa*, *Asun*, *Asanna.*—Rather a common tree in our forests, both coast and inland. The wood is strong and tough. Stands the action of water well: hence it is often used for the frames of wells, whereon the superstructure of masonry is erected. This wood deserves, in my opinion, to be more extensively known than it is. It is also used as beams for houses.

31. *Buchanania latifolia*, *Char*—*Charolee*, *Char.*—A straight-growing tree, and wood rather strong. It is more common in the inland than in the coast jungles. Is seldom found of thickness more than sufficient for posts. Fruit tastes like an almond, and affords a fine oil.

32. *Butea frondosa*, *Pullus.*—The tree is common in forests,—more so in those inland than on the coast. In the former localities, especially in Guzerat, it may be seen covering almost the whole of the uncultivated country. The wood appears to be little used in the Konkun and other southern countries; but in Guzerat (where it is called Bastard Teak) it is extensively employed for house purposes, and from what I have seen of it, I deem that it is both durable and strong-grained. The roots afford a strong rope, and the beautiful red exudation forms one of the gum kinos of commerce. The flowers give a bright yellow dye.

C

33. *Cæsalpinia sappan*, *Puttung.*—Tree not indigenous with us. It is, however imported in quantity from the Palghaut jungles (?) for dyeing purposes. It grows freely in our cultivated places without any care, but I remark that the

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heart-wood is dingy, and wants that fine pinkish red which the imports from the southern forest have.

34. *Calophyllum inophyllum*, *Oondie*.—Common on the coast, growing on sandy sheltered spots close to the sea on the coast south of the Savitree. North of that river it is rarer. The wood never reaches any size, and is always crooked. A good bitter oil is furnished by the seeds. To the best of my knowledge, the poon spars are furnished by *Calophyllum angustifolium*, which is a magnificent tree in the ravines of the Southern Ghauts. In habit and appearance it is totally distinct from this species. These spars are found along the Ghauts, from the Sawunt Waree border southward, but rarely of any great size till the line of the Neelcoond Ghaut is passed.

35. *Canthium nitens*, *Our C. didymum?* *Canthium umbellatum* (Wight).—If I am right in this conjecture, the tree is a common one on our Ghauts, and, from its flowers and shining leaves, well worthy a place in gardens. The wood is small, and not to put to any use.

36. *Canthium parviflorum*.—A small shrub, found on many of the barren wastes of the Deccan, and on hill ridges. I have never seen it of a size sufficient for any economical purpose.

37. *Capparis divaricata*, *Pachounda*.—If I am right in divining the species alluded to by Dr. Wight, here is a tree not uncommon in the more arid wastes and dry hedges of the interior. I have not seen it applied to any use excepting for firewood.

38. *Capparis grandis* (?) *Our C. brevispina?* *Waghutty*.—Common in waste places inland. Wood hard, and good for turning.

39. *Carallia integrifolia*, *Phunsee*.—A handsome tree, pretty frequent in the forests of the South Konkun; not seen elsewhere. Wood hard, close-grained, and might be used in turning. It is seldom large enough for any other purpose.

40. *Careya arborea*, *Koombha*, *Wae koombha*.—A tree very common both in our inland and coast jungles. It is said to stand the action of water well, but the wood does not seem to be much used. From its being generally crooked, it may be worthy a trial for the crooked timbers of boats, cornering of carriages, &c. It is employed in the upper frame-work of wells. The bark furnishes slow-match for matchlocks.

41. *Caryota urens*, *Ghaut Palm*, *Mhar*, & *Phoenix sylvestris*, *Sindee*, *Wild Date-palm*.—I mention both of these under one head because the trunks, freed from the inner pith, are chiefly used as convenient and economical water conduits. The latter is also most extensively used for the formation of embankments, temporary bridges, and piers. The wood of No. 1 (I mean that outside the pith) is nearly as hard as flint, of which, indeed, like all the grasses and palms, it contains a considerable quantity.

42. *Ocsearia elliptica*, *Bhogara*.—A small tree, not uncommon near the Ghauts, much less so elsewhere. It is too small for timber purposes, but a distinct species, which may be seen growing at Darebae Wurgaum, off the horse road from Jooneer to Nuggur,  $\frac{1}{2}$  of a size fit for house-building. I have not seen this species elsewhere.

43. *Cassia fistula*, *Bawa*, *Bayu*, *Gurmala*.—Common in our forests on the sea-board as well as above the Ghauts. It is one of the last trees which lingers in a country recently cleared. The wood is of moderate strength, but very liable to crack after drying. The pods form a small article of commerce.

44. *Celastrus montana*, *Mal Kangunee*.—A scrubby, crooked shrub, found in barren hills, chiefly of the Deccan. The wood is sought after as a choice dunnage for roof tiles, said to last for forty years,—a duration greatly exceeding that of any other dunnage material.

45. *Cedrela toona*, *Kooruk*.—Not a common tree in our forests, but found in some of the greenwood jungles about the Ghauts, and also in the hill range abutting on the Rajpooree Creek to the south. The wood is a choice one for cabinet purposes, but is not used for any others, except for house beams, when it is procurable in quantity sufficient. In the Raees of the South Konkun and Lower Canara the tree is more common. It is, in as far as I am aware, never found inland.

46. *Cluytea collina*.—This tree is not found, in as far as I have seen, within our limits.

47. *Chickrassia tabularis*, *Pubha*, *Pabha*.—A fine straight-growing tree, rather common in the southern jungles, but much less so in the northern. Wood is valuable for cabinet and house purposes. It furnishes one of the Deodars of Malabar. Could be readily creosoted.

48. *Chloroxylon swietenia*, *Satinwood*, *Hulda*.—With us I have never seen it reach beyond the size of a small tree, which, when straight (seldom the case), would afford a log squaring three inches. It is rare, being, in as far as I have seen, found only in the Padshapoor jungles, and in those of the upper Mool, in the Ahmednuggur Collectorate. In the coast forests I have never seen it. The wood is heavy and strong, and reckoned very excellent for pieces of agricultural implements. I have not seen it used in cabinet-work in the Bombay territory.

49. *Chrysophyllum acuminatum*, *Tarsee phul*, *Sapotaceæ* in *Gutta Percha* family.—Of this tree I have only heard as existing in some of the Ghaut jungles of our Southern Konkun, but have never seen it except in the Upper Canara and Soonda forests, where it is rather common. The wood seems straight and good, but the tree is chiefly noticeable from the Gutta Percha-like incrustation common on the fruit.

50. *Cinnamomum iners*, *Ran dalcheenee*.—The



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tree is found only in our Ghaut forests, chiefly to the south. The wood is rather strong, but is little used in house-building, or for implements.

51. *Conocarpus latifolia*, *Dawura*.—Varies in size from a scrubby shrub to a great tree, according to soil and situation. Seems to be as common in the inland forests as it is in those of the coast. The wood is well described by Dr. Wight as very strong. It is also tough, and hence is much in use for the wooden axles of carts. It is much used in agriculture and house-building. This also is one of the trees which should be largely increased.

52. *Cordia Rothii*, &c. *Bokur*.—The different species or varieties noticed here do none of them give a timber fit for anything but firewood. They are not uncommon in the forests, but are more generally met with near cultivated lands and villages.

53. *Cratæva Roxburghii*, *Kurwan*, *Koomla* (?).—Not a common tree. I have not seen it in forests. The wood is white, and (I believe) one of those used for the purposes of the turner.

54. *Cupania canescens*, *Ambu curb*.—Tree common in the upper Ghaut jungles. Wood of average quality, but does not bear exposure. I have not seen it elsewhere.

55. *Cullenia excelsa*.—I have not met with this tree within our bounds.

### D

56. *Dalbergia latifolia*, *Seesoo*, *Seesum*.—Is rather common in most of our coast forests, particularly in ravines of the hills and under the Ghauts, also on the Ghauts; but with us it never reaches the great size which it attains in Malabar. It is also often crooked. The wood is extensively used for cabinet-work, knees of vessels, agricultural implements, combs, &c. It appears, in density of grain and endurance, much superior to the Sissoo of Hindoostan.

57. *Dalbergia Ojienensis*: *Tewus*, *Tunnus*.—Found both in the Konkun and inland forests; especially common in some parts of Kolwan, Khandeish, and the Satpoora Hills. It is a wood of great strength and toughness, especially applicable for cart-building, ploughs, &c. Seldom reaches a size sufficient to give a plank of 9 inches.

58. *Dalbergia paniculata*, *Phassee*.—A tree rather common in most of the forests, both of the coast and inland. The wood is light yellow, strong, compact, and fit for many purposes in house-building, agriculture, &c.

59. *Dalbergia sissooides*.—I do not recognise this as being with us a species distinct from *Dalbergia latifolia*.

60. *Dichrostachys cinerea* (?) A small scrubby tree, common in waste places of the inland country; I have not seen it near to the coast. The wood is good for pegs, but too small for any other purpose.

61. *Dillenia-pentagyna*, *Kurmul*.—A great tree, common in the Konkun and Ghaut jungles; never found inland. I do not find that the wood is used for any purpose more important than for the loose planks used in the decks of Native boats. It is not employed in house purposes.

62. *Diospyros cordifolia*, *Goundun*.—Not uncommon, but more in ravines and waste places than in forests. I have never seen a tree that would turn out a log 4 inches square. The wood is strong and durable.

63. *Diospyros melanoxylon*, *Abnoos*.—The Ebony tree. I have not seen it in any of the Bombay forests. It is found sparingly in those of North Canara, as below the Woolwa Ghaut, and near Meerjan, inland.

64. *Diospyros montana*, *Teemroo*, *Teemboornie*.—Heart-wood dark and strong. Fitted for agricultural implements, in-door work, &c. Does not bear exposure. Could not be creosoted. Tree very common in our larger jungles, both near the coast and elsewhere. Fruit rather palatable. It would be one of the most common of our mountain trees if allowed to grow; but it is generally cut off for burning material, or such like worthless purposes.

### E

65. *Ehretia ovalifolia*, *Gundun*.—The tree is found about towns, never in forests. The wood is of no account.

66. *Elæodendron Roxburghii*, *Bootkus*.—I have never seen this tree, which is more common in the inland than in the coast forests, of a size fit for timber. The wood is strong and compact.

67. *Eriodendron anfractuosum*, *Shameula*.—Not common, save in some parts of Khandeish. Wood is worthless.

68. *Erythrina Indica*, *Pangara*, *E. suberosa*, *Ran pangara*.—A common tree in all parts of the country, but more so on the coast. Its place in the forests is generally taken by *Erythrina suberosa*. I am not aware that it is applied to any purpose except the making of sword-scabbards. For these it is a first-rate material, and may be exported to Europe so soon as the eyes of the military public shall have been sufficiently opened to the necessity of sacrificing clank and shine to utility in the matter of sword-scabbards.

69. *Eugenia caryophyllata*, *Rat jambool*.—Is hardly found north of the Savitree. South of that river it is found only in Raees or green-wood jungles, and about temples. The wood appears quite equal to that of the common Jambool.

70. *Eugenia jambolana*, *Jambool*.—Found in all our Ghaut and coast forests; also pretty extensively near villages, when it has been planted. I think Dr. Wight under-rates the quality of the wood. It makes excellent beams, but, on account, probably, of its brittleness, is never cut

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up for cabinet purposes. The bark affords a large supply of kino extract.

71. *Euphorbia tirucalli*, *Seyr, Teg, Unarmed milkbush*.—The wood of this, when mature, is reckoned very strong, and durable when not exposed to wet. It is extensively used, whenever procurable, as a dunnage material for the flat roofs of houses. It is sufficiently close-grained to be useful to turners. Could, I think, be readily creosoted, but is very seldom of scantling sufficient for sleepers.

72. *Euonymus garcinifolia* (?).—A small tree, growing near to the Ghauts in the upper country to the south. It seems to be often cultivated in Canara, on account of its straightness, as applicable for house rafters. It does not reach a size sufficient to fit it for general purposes.

### F

73. *Feronia elephantum*, *Kowith, Kowta*.—The tree is most common in inland jungles, but grows well everywhere. In Guzerat it attains a good size. The wood is used in building, and could probably be creosoted, so as to bear exposure.

74. *Ficus t'siela*, *Datira*.—Timber not of any account; rather common in the ravines of the Ghauts, but not in open forest land.

75. *Flacourtia montana*, *Ran tambut, Uttuck*.—A tree common in forests above and below the Ghauts, but does not, in as far as I have seen, extend inland. The wood is rather strong and close-grained, but the girth is never such as to render it sufficient for general purposes of carpentry or building.

### G

76. *Gardenia turgida*, *G. montana* (?).—I do not recognise this species or variety; neither do I find it noticed in Dr. Wight's Prodrum. If it be our *Gardenia montana*, the tree is rather common in the coast and inland jungles. It may be recognised by its straight stem, long stout thorns, and general absence of leaves. The wood is hard, but always small, never squaring to more than 3 inches.

77. *Garcinia glutinifera*.—I believe that a *Diospyros* must be here meant. It may be that our *Garcinia sylvestris* is alluded to. If so, the tree is one common in the Southern Konkan, Malabar, and Canara; always planted; affording a good wood and palatable fruit, from the kernel whereof is extracted by boiling the vegetable concrete oil "kokum." The dried fruit is a common ingredient in Native cookery, having an agreeable acid.

78. *Garuga pinnata*, *Kooruk*.—Common in our jungles. Wood appears of little value; might be creosoted.

79. *Givottia Rottleriformis*, *Reetha*.—Found only in a very few of our Bombay jungles, and in these only inland above the Ghauts. Not seen in Guzerat. The wood is light, and, in as far

as I know, used only for making the figures and models manufactured at Gokak, in the Southern Maratha Country.

80. *Gmelina arborea*, *Shewun*.—A large tree, not very common; found more in the forests below the Ghauts than inland. The wood is in much esteem for carriage pannels, and other purposes. According to Dr. Roxburgh, it also stands exposure to weather and water well. From its great size, straightness, and general speciousness in appearance (being a beautiful flowering tree), this is one of the most desirable for propagation throughout the country.

81. *Gmelina asiatica*, *Kanta, Shewun*.—This shrub I have not seen put to any use, excepting as a part of a fence.

82. *Grewia tiliifolia*, *Damun*.—This is a common forest tree in the coast jungles; rare inland. The wood is not of any value for household purposes, agricultural implements, or cabinet-work. The bark gives a strong rope.

83. *Guatteria cerasoides*, *Hoom*.—A tree common in our coast and Ghaut forests; less so inland. May be easily recognised by its great straightness, and handsome appearance. Wood is useful in carpentry, as well as for naval purposes, as boat-masts, small spars, &c. It is reddish and close-grained.

### H

84. *Hardwickia binata*, *Anjun*.—I have seen this tree only in some parts of Khandeish, and in the Padshapoor jungles. The wood is darkish colored, close-grained, very strong, and serviceable. As the shoots grow up very straight, it is also valuable for rafters.

85. *Holarrhena*.—I have not found this tree in our jungles, therefore cannot speak of it.

86. *Hydnocarpus inebrians*, *Kowtee*.—The wood is not used for any purpose. The seeds of the fruit afford an oil. The tree is hardly found in our northern jungles on the coast; more frequently in those south of the Savitree river.

87. *Hymenodction obovatum*, *Kurwe*.—The remarks made on *H. utile* apply here. We have the two species, but the wood of neither is fit for anything but fuel.

88. *Hymenodction utile*, *Kurwe*.—I cannot learn that the wood of this tree is ever used, except for firewood. The tree is common enough, in rocky slopes mostly, in or near thick forest. It does not stretch inland beyond the limits of the Ghaut ravines.

### I

89. *Inga xylocarpa*, *Jamba, Yerool (Canarese)*.—Is not uncommon in our sea-board forests south of Panwell, but not to the north. It never with us seems to grow straight to any size, so that it could be applied to house or ship-building. The wood is of a superior quality, and, in the Madras province of North Canara, is most



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abundant, particularly between Sircee and Yelapore.

90. *Ixora parviflora*, *Koora*.—Tree is common in the coast jungles, but seldom sufficiently long or straight for household purposes. The wood is rather of good quality. It is more used for torches than for any other purpose.

### J

91. *Jambosa salicifolia*, *Pan jambool*.—A crooked species of Jambool, growing much in the rivers of the Deccan country and Konkun. The stem is generally useless for house purposes, on account of its crookedness, but the straight shoots are eagerly sought after as rafters.

### L

93. *Lagerstræmia microcarpa*, *Nauah*, *Bondara*, *Benteak of Malabar*.—I think Dr. Wight under-rates the quality of this wood. It is very fit for many household purposes, and for the decks of ships, &c. It is very common in our forests, but less so to the north of the Savitree than to the south of that river. It is much used in the Dockyard, which forms a good presumptive proof that the wood cannot be very inferior.

94. *Lagerstræmia regina*, *Mota bondara*.—Timber is reckoned rather good, and is used (being generally crooked) for the knees, &c. of Native boats. It is common in the jungles, below the Ghauts south of the Savitree river; hardly found north of that, and never in the inland jungles.

95. *Limonia alata* (?).—Is found only in our southern Ghaut forests, above and below. The wood has all the qualities attributed to it by Dr. Wight. It is not a common tree.

### M

96. *Mangifera Indica*, *Amb*.—A very serviceable wood for plank when not exposed to wet. It is much used for house purposes, much less for carts. It seems to bear the action of salt-water better than that of fresh; hence is used for canoes. Could be readily creosoted.

97. *Melia azadirachta*, *Neem*.—The Garden Neem; our *Melia sempervirens* I take to be the one here meant. The wood is worthless, except for cabinet-work, for which it is fitted by its colour and grain.

98. *Melia bukaen*, *Bukhun*.—Differs from the foregoing in several respects. I have seen it only in the upper country. Though very similar to the last in leaf, and general appearance, the smoothness of the bark and smaller size of the fruit at once indicate a distinction. The tree is found only about cultivated holdings. The wood is very strong and valuable for beams, roof-dunnage for terraces, and many other purposes. It has also the useful property of shooting from the root when once cut down with as

much vigour as teak does. It is a tree deserving of extensive increase.

99. *Melia superba*, *Neembara*.—A great tree, not uncommon in the Konkun jungles, but not seen elsewhere, except occasionally in Guzerat. Used in the making of frames for native drums. The wood is of good quality, but inferior in strength and durability to that of *Azadirachta Indica*, the common or mountain Neem.

100. *Memecylon tinctorium*, *Kurpa*, *Anjuna*.—A tree of rather a small size; common on the Ghauts above; not seen elsewhere. Wood is very strong, and tough. Does not yield readily to wet. Is much employed, when procurable of sufficient size, for agricultural implements, cart-furnishing, &c.

101. *Mesua ferrea*, *Nag champa*, *Pynaroo* (?) *Malabar name of a second species*.—Tree never reaches any great diameter, but the wood is very strong and tough. I have not seen it in forests, but much about villages and Brahmins' gardens to the south. The latter species, *Pynaroo*, gives one of the finest woods I have seen.

102. *Michelia Nilgirica*, *Michelia champaca*, *Peela champa*.—This tree I have not seen wild in forests. In gardens and about dwellings it is common. The wood is straight, and moderately close in grain. It could be turned to account in house-building, and might with advantage be creosoted, but it is not sufficiently common to be extensively used.

103. *Mimusops elengi*, *Bukool*.—Mostly found as a cultivated tree; more rarely wild, and then only below the Ghauts. I have used the wood for cart shafts, and found it strong, and rather durable.

104. *Mimusops hexandra*, *Keernee*.—This tree is common in Guzerat, where it reaches a great size. It is seldom found in our forests. The wood is rather strong, and much used for well-frames in Guzerat. I have not seen it used elsewhere. Fruit is nutritious and palatable.

105. *Morinda citrifolia*, *Al*, *Bartondie*.—Not a common tree in our forests; more common about villages. The wood makes tolerable plank, but appears never to be used, except for door-shutters and such like.

106. *Myristica cinerea*, *Ran jaeophul*.—A great and straight tree, found in green-wood jungles or Raees above and below the Ghauts. It is not sufficiently common, nor found generally in situations easy of access, so as to allow of its being used for household or agricultural purposes. The wood is white and compact.

### N

107. *Nauclea cordifolia*, *Hedoo*.—A common tree in our coast forests; straight, and of large size. Never found inland. The wood is most extensively used for all purposes of planking in in-door work. Painted, it appears to stand expo-

## FOREST TREES OF WESTERN INDIA.

sure to the weather for years. Could probably be creosoted to advantage.

108. *Nauclea parviflora*, *Kuddum*.—Rather a common tree in the coast forests; less so inland. Is found, however, in quantities in the dells above the Ghauts. The wood is reddish coloured, close-grained, and rather valuable for gun-stocks, in the making of which it is chiefly used. This wood could not be easily creosoted.

109. *Nephelium longanum*, *Woomb*.—This tree is confined to our Raees or green-wood jungles, in and below the Ghauts. It is never used, in as far as I have seen, either by the carpenter or the agriculturist. In fact it is too rare to be so.

110. *Nerium antidysentericum*, *Duola kooda*.—A very common shrub in waste places, and on hills all over the South Konkun. Less so in the North Konkun and interior, but still common. The wood is hard, and fit for the turner. It never reaches a size sufficient to render it fit for the carpenter. Experiments on the bark of this tree are sadly wanted with us.

### O

111. *Odina woodier*, *Mageer*.—Found in our coast jungles, but not common. I have not seen it inland. Wood is, with us, of no account.

112. *Olea dioica*, *Par jamb*, *Karambu*.—A tree common on the Ghauts, but seldom below or inland above. The wood is of good strength, and might be creosoted with effect.

### P

113. *Pentaptera arjuna*, *Arjun*, *Sadura*, *White Aeen*.—A forest tree, rare in the North, but very common in the South Konkun, from Rainghur southward. It is always found in the vicinity of streams and rivers. Reaches a very large size, and is esteemed equal to the Black Aeen, though the rapidity of its growth would hardly countenance this opinion. The bark is justly celebrated as an application to wounds.

114. *Phyllanthus emblica*, *Aonlee*.—Tree is pretty common, both inland and on the coast. Wood is rather durable, but seldom obtainable sufficiently straight, except in gardens, where it is often grown.

115. *Pongamia glabra*, *Kurunj*.—Of this wood I cannot speak from experience, but from its look I think it may be of some use for household purposes. The tree is common in forests chiefly, near and under the Ghauts, and will generally be found skirting streams. The bitter oil is much used in the manufacture of Native felt, and has great curative powers in itch and mange.

116. *Premna integrifolia*, *Chamaree*.—The remarks made in regard to *P. tomentosa* apply here. The shrub is rare, save about the Ghaut heads.

117. *Premna tomentosa*, *Chumbara*.—I have not seen the wood of this small tree brought

into use for any purpose. It is found, but is not common, in and about the Ghauts.

118. *Prosopis spicigera*, *Soundur*.—A tree common both in waste places and forests. With us it never reaches a size which would afford a square log of more than 6 inches on each side. In Sind, where it is common, it reaches a large size. The heart-wood is very strong, tough, and dark coloured. In Sind it is commonly used for weavers' shuttles. This is the chief tree worshipped at the Dusera festival.

119. *Pterocarpus marsupium*, *Beebla Honee*.—Not common in our forests, but most so in the northern inland ones, and also in those of the extreme south, as in the Bedee Talooka. Reaches a great size, and the wood is much used in house-building. It does not stand exposure to wet.

120. *Pterocarpus santalinus*, *Rukt chundun*.—Of the qualities of the wood of this tree, not indigenous with us, but found in Malabar, I cannot speak from personal experience, and I will be glad to be furnished with further information.

121. *Putranjiva Roxburghii*, *Jeewunpootr*.—It is not common as a forest tree with us, and is found only in the coast jungles. I have never seen it of any size, but the wood appears hard, strong, and durable. It is a good wood for turning.

### R

122. *Randia dumetorum*, *Gehela*.—One of the most common trees in all our forests, but the wood never reaches any size. It is strong and hard.

123. *Rhus Buckiamela*.—Not found with us. The chief representative of this tribe in our barren hills is *Rhus mysorensis*, a scrubby shrub, fit only for firewood.

124. *Rottleria tinctoria*, *Sendree*.—A tree common both in the inland and coast jungles. Wood is of fair quality, when not exposed to wet. It is not readily attacked by worms.

### S

125. *Salvadora Persica*, *Peeloo*.—I am inclined to think that the wood of this tree is well worthy of more extended trial, as it seems rather strong, and of compact grain. It is not a tree common on this side of India Proper, except at Musulman Durgahs and places of worship; also wild on the coast in the Hubshee's Country, and in the Southern Maratha Country, and seldom reaches any size. In Sind it is more common, and grows considerably larger.

126. *Santalum album*, *Chundun*.—Appears to grow wild anywhere with us, and may be seen in quantities in waste gardens, and even in some of our grass preserves. It is said the wood has not the high qualities of that found in the more southern provinces. In the Dharwar Collectorate there are about 153,000 trees,—a number which



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much exceeds that found in the whole length and breadth of our more northern provinces. From the facility with which the tree is raised, and the great abundance of the seed which it furnishes, I am of opinion that its extension should be kept in view. The objection taken, as to the inferiority of the wood, I do not look on as well founded.

127. *Sapindus emarginatus*, *Areeta*.—This tree is often found planted, near Musulman buildings especially, but is, to the best of my knowledge, not indigenous in our forests. I have not seen the wood used for any purpose except fuel, but information is wanted regarding it.

128. *Schleichera trijuga*, *Kusoomb*.—The wood has all the good qualities described by Dr. Wight, but with us it reaches a size so large that it is used for making screw rollers for sugar-mills, cotton-presses, &c. The tree is common in the forests of the North Konkun, but less so in those of the Southern Konkun.

129. *Semecarpus anacardium*, *Beebwa*.—The tree is common rather in the skirts of than in forests, where its place is taken by another species, *Semecarpus cuneiformis*. The wood is not of any value, but might be turned to some account by being creosoted, which the openness of its fibres would admit of its being.

130. *Sethia Indica*.—This tree I have never seen. It is not found in our forests.

131. *Soyimida febrifuga*, *Rheyn*.—Vide *Swietenia febrifuga*: No remarks need be added here.

132. *Spondias acuminata*.—Sufficiently common in all the forests, both coast and inland. The wood in its natural state is not of any value, but could be creosoted with advantage.

133. *Spathodea arcuata*, *Mersingee*.—A tree common in the coast forests, but not (I think) found at any distance inland above the Ghauts. The wood is white, compact, and strong. It is, I believe, used by the turner.

134. *Sterculia balanghas*.—A tall and straight tree, common in forests of the coast. It may readily be distinguished at certain seasons by its large pink fruit. The wood is of open grain, so that it probably could, by being creosoted, be made useful in various ways.

135. *Sterculia foetida*, *Bastard Poon*.—Not common in forests, but more frequently about cultivated holdings on the coast. It grows up tall and very straight. Is used as a substitute for the true Poon spar in small country vessels.

136. *Sterculia urens*, *Kundol*.—The tree is common, both in inland and coast forests. May be always recognised by its peculiar bark, looking as if painted a light pink. Wood is worthless. Leaves and tender branches of great use in certain cattle diseases.

137. *Stereospermum chelonoides*, *Padul*.—I have never seen any reason for the opinion of Dr. Wight as to there being two varieties. We

certainly have only one, bearing beautiful fragrant pinkish flowers. The tree is not common in forests, but is found especially in those of the coast and Ghauts. I have not seen it in the inland jungles. The wood is good for interior building, but seldom procurable of a size fit for anything but posts.

138. *Stereospermum suaveolens*, *Padeel*, *Purrul*.—A tree very rarely found in our forests. May occasionally be seen in the Konkun near a temple; evidently planted for the sake of its beautiful flowers. It abounds in the Soonda forest. The wood is strong and serviceable.

139. *Strychnos nux vomica*, *Jehr katchura*.—Common in the South Konkun, particularly in shady ravines. Does not appear either north of the Savitree, or inland. The wood is reckoned of average quality, and could readily (to all appearance) be creosoted.

140. *Strychnos potatorum*, *Neermullie*.—Is with us found only in a few localities. I have seen it in the hills of the Satpoora Range near Arrawad, and in the jungles of Doodi, on the Gutpurba.

141. *Symplocos racemosa*, *Hoorra*.—Found only in the jungles of the highest Ghauts. Yellowish wood, but appears strong and compact. It might be used in cabinet-work, as well as for other purposes.

142. *Swietenia febrifuga*, *Rheyn*.—The wood is reckoned strong, and good for indoor purposes, but not adapted to those requiring exposure to sun and weather. The tree is chiefly found in the northern forests, and is more common in those inland (as about the Satpoora Hills) than in the coast forests. The wood is chiefly used for cabinet purposes. The bark is deemed (as the name implies) to have some virtue as a remedy in fevers.

## T

143. *Tamarindus Indica*, *Cheetz*, *Umlie*.—Is not a tree common in forests, but very much so near old temples, gardens, &c, where it has been long ago planted. The heart-wood is very strong and durable, but carpenters are very unwilling to work it up, on account of the great damage it causes to the best tempered tools.

144. *Tectona grandis*, *Teak*, *Sagwan*, *Sa-ya*.—The representative of the oak in India. In strength it is, as Dr. Wight observes, inferior to some other trees, of which *Dalbergia oojenensis* or *Tunnach* may be mentioned as one. In general qualities, however, and especially in endurance under exposure, it seems superior to all other Indian woods. Differences in quality, according to latitude, soil, or situation, are very observable. It is commonly said that northern Teak is superior to that of Canara; that this again is of greater strength and endurance than the Malabar wood; and that the Teak of Pegu is the worst of all. For this distinction there is

## FOREST TREES OF WESTERN INDIA.

some foundation, but I think by no means to the extent named. I have seen some Teak, grown in the richer valleys of the northern Dang, inferior in strength and compactness of grain to that imported from the inland hilly parts of the southern peninsula, as the Annamala Forest, situated between Coimbatore and Malabar. There is, however, no doubt but that the eastern Teak, from Salween and other rivers, is considerably inferior in strength and durability to that of Malabar.

145. *Terminalia alata* (?) *Pentaptera paniculata*, *Keenjul* (?)—I believe that our Keenjul is here meant. It is common to the south, but not known to the northward. Wood is equal to the common Aeen. The *Aurora* cruiser was built of this wood.

146. *Terminalia belerica*, *Yehela*, *Berda*.—A large and fine-looking tree, found in all our jungles, both on the sea-board and in the interior. Wood is worthless for building houses and canoes, as it is very readily attacked by worms.

147. *Terminalia belerica*, *Berda*, *Yehela*.—Is one of the largest trees in the forest. Found abundantly both in the inland and coast jungles. Although straight, and of great scantling, it is quite useless as a building timber, being immediately attacked by worms.

148. *Terminalia catapa*, *Bengali badam*, *Bengal almond*.—This tree is not indigenous to the Bombay Presidency, but is common in the gardens of Europeans and Natives. The wood does not appear to me to be of average quality, or fit either for domestic or public purposes, excepting for firewood.

149. *Terminalia Berryi*.—This tree is not indigenous with us, neither are there as yet any specimens of it in the Botanical Gardens.

150. *Terminalia chebula*, *Heerda*.—With us in jungles more rare than on high table-lands, on and near the Ghauts. The wood is strong, and rather hard, but on this side of India does not reach any great size, and is generally gnarled, owing to the exposed situation in which it grows. I am of opinion that in describing it as a most gigantic tree, Dr. Wight must have confounded the wood of *Terminalia belerica* with that of this tree.

151. *Terminalia glabra*, *Pentaptera glabra*, *Aeen*, *Mairtee*.—Is the well-known Aeen, found most abundantly in all our coast jungles, and also in those above the Ghauts. Valuable for house-building and many other purposes. The wood burned appears to yield very pure lime.

152. *Thespesia populnea*, *Bendie*.—This tree is found only on our coasts, and in districts near the coast. It seems to have been introduced from the Eastern Islands by the Portuguese. The ripe timber is very strong and durable, with a colour like Mahogany. It is much used in the construction of cart-wheels, and the timbers of

Native boats. The shoots are also in extensive use as rafters for houses, and at all times fetch a good price when sold for this purpose. It is, as Dr. Wight observes, very difficult to find an old tree not hollow and decayed. Government have now an extensive Bendie plantation at Sakuria, in Alibagh, and at Sat Tar. The tree grows most readily from cuttings.

153. *Trophis aspera*, *Kurrera*.—More common in Guzerat than in other parts of the country. It is rare in forests. Wood is reckoned of good quality for small purposes. It will seldom be found to square above 4 inches.

### U

154. *Ulmus integrifolia*, *Wowlee*.—Wood is rather good, but does not bear exposure well. Could probably be creosoted. Tree is rather common in the Konkun, but less so in jungles than near to villages and towns.

### V

155. *Vitex altissima* (?)—I am not sure as to the species which Dr. Wight had in his eye when he remarked on this. We have two varieties of the tree: form the first, *Vitex leucoxydon*, not uncommon by the edges of streams in the South Konkun, and the Ghaut jungles; the other *Vitex alata*; rare. Both have a white compact wood, apparently good for turning, as well as for cabinet-work.

### W

156. *Wrightia tinctoria*, *Kala kooda*.—A small tree, very common in all our forests. Wood close-grained and white, as described by Dr. Wight. Leaves are said to afford an indigo. Hence the name. It is extracted by sealding.

### Z

157. *Zizyphus glabrata*, *Ran bor*.—Wood close-grained and good. Bark affords a quantity of kino-like gum, both by exudation and by decoction. The tree is most common in cultivated lands, and in alluvial soil on the banks of rivers. It is less common on the coast than inland.

158. *Zizyphus jujuba*, *Bor*, *Bher*.—I have failed to find any specific difference between the wild and this the more cultivated species; therefore the remarks made in No. 157 may apply here. The wood often reaches a large size, fit for planks or sleepers, for which latter it might, in the dry climate of Sind (where the tree is common), answer well. *Zizyphus xylocarpa* (Gol Bor) is another species, which makes excellent torches, but is fit for no other use.

159. *Zizyphus anoplia* (?)—This shrub I have never seen but as a climber. The bark affords a good deal of kino.

160. *Zizyphus xylocarpa*, *Got bor*.—The tree is very common in the coast jungles, but I have not seen it inland. It is, in as far as I have seen, useful only for torches, for which it is valuable; the fruit burned forms the base of a good blacking material.—Dr. Gibson *ut supra*.



## FORESTS OF NAGPORE.

It will, says Captain Sankey, be clearly seen from the remarks on Statement II. that a gap in the supply of teak timber, at a low price, will probably occur between the years 1858 and 1882 (6 years being the supposed limit of the capabilities of the present source and 30 years being the time required for the Koomerponi jungle to attain its full and proper growth,) and, that it will be for the interest of Government to employ in a great measure jungleground, (particularly Eyne, Arjoon, and Bejasar from the Deogur, and Jobnee jungles,) during the interval, I hope I have placed on sufficiently strong grounds; vide Statement VI. But again, the supply of jungleground will probably prove insufficient in quantity. It is to this point that I am anxious to draw particular attention; for the Chandah districts, (that part in the left bank of the Wyne Gunga) in that case, must be looked to for a supply of teak. There, according to all accounts, almost boundless forests of the finest timber exist. The means of transport, offering itself in the broad stream of the Wyne Gunga, are at hand, and nothing but accurate information is required about localities. That no such information is at present to be had is clear, from the country being written "unknown" on the very best charts; all apparently known is that Boojung Row's Zemindaree is inhabited by a wild race of men. Even the position of Panawarras, the place where my present supply comes from, was only hit upon by chance after very great labor.

In conclusion I have only to say that should my services, in examining the Chandah jungles during the next favorable season, (they are only open from all accounts for two months in the year) and laying down the longitude of points in this unknown district, be deemed available, I would gladly undertake the duty, with the aid of a few instruments from Madras, and two or three experienced Lascars from the Quarter Master General's Office at this station.

*STATEMENT I of names and sizes of wood procurable in the Nagpore territory, with general remarks upon grain, color, and uses, and with probable prices per cubic foot.*

Number.	Language.	Names.	Sizes procurable.				Prices per cubic foot.			
			Average.		Max.		Govt.		Bazar.	
I.	Botanical.	Tectona Grandis.								
	Vulgar.	Teak.	Length in Feet.	Girth in Feet.	Length in Feet.	Girth in Feet.	Anas.		Pies.	
	Hindustani.	Sagwan.					Anas.	Pies.	Anas.	Pies.
	Mahratta.	Sagwan.								
	Tamil.	Theakamarm								
			30	5	64	4½	7	7¼	12	0

*Obs.*—There are two varieties of teak procurable, one of a light the other of a dark color; the former is that now stored in my timber yard. It seasons quickly, apparently does not lose its essential oil, and by all accounts is a better and stronger wood than the darker variety, which, drawn from the Langee jungles, was that formerly employed in the Department. Door frames of 20 years standing on removal have been found ant-eaten, but these are the only instances of such having taken place. The natives use it particularly for the construction of bowries, (by placing rough mortised frames one over the other as in the shaft of a mine) and they say when thus emersed continually in water, it lasts in an extraordinary manner. They moreover construct all terrace roofs, ferry boats, solid wheels of bandies, &c from it, as well as use it extensively for furniture.

Number.	Language.	Names.	Sizes procurable.●				Probable Government price per cubic foot.	
II.	Botanical.	Pterocarpus marsupium.	Average.		Max.		Annas.	Pies.
	Hindustani.	Bejasar or Bejasal.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.		
	Mahratta.	Bheulah.						
	Tamil.	Vengaymarum.	18	4½	30	3½		

## FORESTS OF NAGPORE.

*Obs.*—Bejasar has a reddish colored heart, surrounded by an outer ring of a white soft wood. This ring varies from  $\frac{1}{2}$  to 3in. in thickness, so that it may be adzed off without very much diminishing the scantling of a full grown tree. It has a very close and frequently winding grain, and is subject to numerous faults. These latter are of a coal black color, and have a charred appearance. Frequently one of 3in. diameter, and considerable length presents itself. On this account it might be a dangerous timber to use for joists. For all works where these would not signify, or would be exposed, as in rafters, bressumers, &c. &c. and generally pieces of small scantling, it would be found a most valuable timber. In strength it is much superior to teak, apparently always retains its essential oil, and, like it, door frames of 20 years standing are the only instances of white ants having attacked the red wood. From the large size which is procurable, as well as the many excellent qualities of this timber, I rank it both as a tie beam and rafter wood.

Number.	Language.	Names.	Sizes procurable.				Probable Govern- ment price per cubic foot.	
III.	Botanical.	Pentaptera tomentosa.	Average.		Max.			
	Hindustani	Eyne.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Mahratta.	Ain or Eyne.						
	Tamil.	Marudammaram.						

*Obs.*—Like Bejasar this timber has white wood surrounding the body and heart, which is of a blackish brown color; the ring however in this case does not exceed 1 $\frac{1}{2}$ in. in breadth. The dark wood is exceedingly heavy, being exactly the same weight as water, and has a much more winding grain than Bejasar. In strength it is far superior to all its forest congeners, and from the strength given by Barlow for American Teak, it even appears to excel that celebrated timber. Unfortunately its length is limited, seldom furnishing more than a 20 feet tie beam, from the crooked manner in which the tree grows. It is a difficult timber to work up, splits freely when in exposed situations, and by all accounts is very subject to dry rot. The latter defect being overcome by the steeping process, and the former guarded against, I know of no timber which can bear a comparison with it; for the joists of a terraced roof it would be invaluable. White-ants will not attack it. I rank it both as a tie beam and rafter wood.

Number.	Language.	Names.	Sizes procurable.				Probable Govern- ment price per cubic foot.	
IV.	Botanical.	Diospyros ebenum.	Average.		Max.		Annas.	Pies.
	Hindustani.	Tendoo.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.		
	Mahratta.	Taimurum or Tendoo.						
	Tamil.	Toombie marum.	18	4½	20	4		

*Obs.*—When young, this tree, which yields a very fine ebony, has very little of the black wood. As it advances in age this increases, and eventually nothing but black wood is found. The white wood is that which has been experimented upon. From the ease with which it bends, the natives employ it in the manufacture of Buggies, Carriages, &c., &c., but losing its essential oil soon, the unseasoned timber is preferred for these purposes. White ants attack it readily, and it is nearly always Beetle bored. Although in strength it excels teak, yet from the above circumstance, as well as from the fact that it is very seldom obtainable of more than 6in. square, I have rejected it as a building material.



# FOREST TREES AND FORESTS OF NAGPORE.

Number.	Language.	Names.	Sizes procurable.				Probable Government price per cubic foot.	
V.	Botanical.	Gmelina arborea.	Average.		Max.			
	Hindustani	Seevum or Seeven.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Mahratta.	Seevun.						
	Tamil.	Coommy maurum.	13	4½	18	3½	5	6

*Obs.*—The Seevum is of a very light color, has a sort of netted grain, is free from faults, and altogether may be considered a very excellent timber, although unfortunately not procurable in large quantities. The Commissariat supply it to the Ordnance Department for making packing cases, &c., &c., and the Natives employ it in the construction of palkies. It takes varnish well, and works up nicely into furniture, but is attacked readily by white ants. From the small scantling of which it is obtained, I must class it merely as a rafter wood.

Number.	Language.	Names.	Sizes procurable.				Probable Government price per cubic foot.	
VI.	Botanical.	Bassia latifolia.	Average.		Max.			
	Hindustani	Mowah.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Mahratta.	Moho.	15	5	20	4	5	0

*Obs.*—The Mowah, from the flower of which the darru is made, and which is extensively spread in forest and plain, is a pinkish colored wood. It is but a weak timber, and from being invariably rotten at the heart, 6 to 4 inches square of really good sound timber is all that can be reckoned on. In the plains the tree is preserved for the flower, as well by general consent as the Rajah's orders, and consequently is very little used. In the upper Provinces I am aware that the timber is more esteemed, and has been used for door and window frames. Nothing more need be said about it (as with a profusion of fine timbers, I do not class it as a building material) except that it is eagerly devoured by white ants.

Number.	Language.	Names.	Sizes procurable.				Probable Government price per cubic foot.	
VII.	Botanical.	Terminalia chebula.	Average.		Max.			
	Hindustani	Hurra or Hurda.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Goandee.	Hurda.						
	Mahratta.	Kuducal marum.						
	Tamil.	Pilla mardah marum.	16	4½	20	4	5	4

*Obs.*—The Hurda has a yellowish colored wood which becomes very dark on the outside in seasoning, it is attacked by white ants, and is inferior in strength to teak; appears to have but little essential oil, and is said to be very subject to dry rot. Steeped in the solution of sulphur of copper, it would be of value, principally from the ease with which it works. The fruit is well known for its dyeing properties. From its not being obtainable of large scantling, I class it merely as a rafter timber.

# FOREST TREES AND FORESTS OF NAGPORE.

Number.	Language.	Names.	Sizes procurable.				Probable Government price per cubic foot.	
VIII.	Botanical.	Acacia ordoratisissima.	Average.		Max.			
	Hindustani	Sirsa.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Goandee.	Chechooah or sunkœur (?)						
	Mahratta.	Sirris.						
	Tamil.	Curry vaugay marum.						
			15	3	18	3	5	0

*Obs.*—The Sirsa has very much the color of eyne, indeed it is only distinguishable from that wood by having a much straighter grain, and being a somewhat lighter wood. It has a ring of from 2" to 3" of white wood, and this part alone is assailed by white ants. The tree is for the most part found in gardens, and I have seen it attain a very considerable size, though, as a general rule only pieces of small scantling are obtainable. The teeles use it frequently for their oil mills, and by the natives generally it is employed for bandies. This although a very superior wood, must, from the small scantling procurable, rank merely as a rafter wood.

Number.	Language.	Names.	Sizes procurable.				Probable Government price per cubic foot.	
IX.	Botanical.	Erythrina Indica.	Average.		Max.			
	Hindustani	Paunjera.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Mahratta.	Paunjera.						
	Tamil.	Moochoo marum.						
			14	3	17	2½	3	0

*Obs.*—The Paunjera is an exceedingly light wood, exactly ½rd the weight of water, and of necessity very weak. It is particularly applicable to many purposes for which deal is employed at home, viz. in making packing cases, &c., &c. The Natives use it exclusively for sword cases. It is eaten by white ants eagerly, and on the whole it must be rejected as a building material.

Number.	Language.	Names.	Sizes procurable.				Probable Government prices per cubic foot.	
X.	Botanical.	Conocarpus latifolia.	Average.		Max.			
	Hindustani	Thoura.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Mahratta.	Thoura.						
	Tamil.	Vellay naga marum						
			12	3	17	2	5	6

*Obs.*—This very promising timber, like many of those before mentioned, has white wood with a heart of a dark color, and somewhat like rosewood. It is so much prized by the Natives for axletrees, that but few trees are permitted to attain their proper growth. By all accounts, about 20,000 axletrees are made from this wood yearly. It is attacked by white ants. Though not obtainable in very large quantities, it ranks high as a rafter timber.



# FOREST TREES AND FORESTS OF NAGPORE.

Number.	Language.	Names.	Sizes procurable.				Probable Government prices per cubic foot.	
XI.	Botanical.	Swietenia febrifuga.	Average.		Max.			
	Hindustani	Rohun.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Mahratta.	Rohuni.	17	4	20	3½	5	0

*Obs.*—The Rohun, as a writer in the Bengal Gazette remarks, “is a mahogany furnishing a febrifugal bark, and believed to be one of the most durable and heavy woods known, and of a blood red color.” The specimens which I obtained might be called somewhat darker in color than here described.—In weight the wood is much greater than water, but by all native accounts it is far from a durable wood, splitting greatly on exposure, and when seasoned becoming extremely brittle. It nevertheless has a fine straight grain, and is not at all so difficult to work as its great weight and compactness would lead one to imagine. Notwithstanding this, and the fact that it rivals the finest English oak in strength, I hesitate to recommend it as a building material.

Number.	Language.	Names.	Sizes procurable.				Probable Government prices per cubic foot.	
XII.	Botanical.	Dalbergia sissoo.	Average.		Maxm.			
	Hindustani.	Seesum.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Mahratta.	Seesum.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Tamil.	Yette marum.	10	3	15	2	6	0

*Obs.*—The Seesum very much resembles rosewood in appearance, but is not so compact, and therefore cannot like it answer well for veneering purposes. The natives employ it extensively for ornamental work. They make combs, domes of Gharries, &c., &c., from it. The white wood, of which it generally has a good deal, is alone eaten by white ants. The dark wood never seems to lose its essential oil, and since it is of great strength, when obtainable of a proper scantling, it may be looked upon as a very valuable timber. In Chandah alone it is said to attain a large size. As it is I class it as a rafter.

Number.	Language.	Names.	Sizes procurable.				Probable Government prices per cubic foot.	
XIII.	Botanical.	Acacia arabica.	Average.		Maxm.			
	Hindustan.	Bhubool	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Mahratta.	Bhabool.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Tamil.	Curvaila Marum.	10	5	14	3½	6	0

# FOREST TREES AND FORESTS OF NAGPORE.

*Obs.*—Little need be said about this well known tree, as it is relatively weak (?) grows to no great length, and is always crooked grained. The natives use the wood for the spokes and felloes of wheels, and exclusively, I believe, for drill ploughs. Though apparently white ants will not attack it, and the wood might be used on emergency, yet under the circumstances, I reject it as a building material.

Number.	Language.	Names.	Sizes procurable:				Probable Govern- ment prices per cubic foot.	
			Average.		Maxm.			
XIV.	Botanical.	Butea Gibsonii. (?)	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas.	Pies.
	Hindustani.	Dhamin.						
	Mahrata.	Dhamun.	15	2½	17	2½	6	0

*Obs.*—The dhamin has fine clear grain, is of a light color, and has many of the properties of "lance wood." From the facility with which it bends, this wood is held in great esteem for Buggy shafts. The natives use it exclusively for the bent ribs of hackary poles. From the extensive use made of it, few, if any, trees attain their proper growth. Were it obtainable of proper size it would rival the finest timber, but under the circumstances, I am obliged to place it among the list of rafter woods, and even here the small quantity obtainable, will limit its application.

Number.	Language.	Names.	Sizes procurable.				Probable Government prices per cubic foot.	
XV.	Botanical.	Cedrela toona.	Average.		Maxm.		Annas.	Pies.
	Hindustani.	Thoon.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.		
	Mahratta.	Thoon						
	Tamil.	Thoona marum.	10	4½	12	3½		

*Obs.*—As I consider this timber, with a profusion of other fine woods at hand, comparatively unsuitable for public buildings, I need merely say that it has nearly the same color as Bejasar, is much lighter and weaker than that wood, and is attacked by white ants. I have seen however some nice light furniture made from it.

Number.	Language.	Names.	Sizes procurable.				Probable Govern- ment prices per cubic foot.	
XVI.	Botanical.	Pentaptera arjoona.	Average.		Maxm.		Annas.	Pies.
	Hindustani.	Arjoon or Unjen.	Length in feet	Girth feet.	Length in feet.	Girth feet.		
	Mahratta.	Azun.	18	4½	30	4		



## FOREST TREES, AND FORESTS OF NAGPORE.

• *Obs.*—The timber of Arjoon is of a deeper red than Bejasar; perhaps it is more of a brown red. Is heavy and splits freely when exposed to the sun's rays. White ants attack it, seeming to prefer moist situations, it grows almost exclusively on the banks of rivers, and to an enormous size, but being frequently rotten at the heart does not always reward the labour of cutting. Its strength is undoubted, and consequently with careful selection, would be found valuable. I class it as a tie beam and rafter wood.

Number.	Language.	Names.	Sizes procurable.				Probable Government prices per cubic foot.	
XVII.	Botanical.	Dalbergia ——— ( ? )	Average.		Maxm.		Annas.	Pies.
	Hindustani.	Thevus.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.		
	Mahratta.	Thevis.	15	3½	17	3½	6	0

*Obs.*—Thevus is a light colored wood merging into a light reddish brown. Its strength is considerable, and by the natives the wood is highly prized for bandies. White ants attack it. Little further being known about this timber, excepting that a small supply is alone obtainable. I rank it as a rafter wood.

Number.	Language.	Names.	Sizes procurable.				Probable Government prices per cubic foot.	
XVIII.	Botanical.		Average.		Maxm.		Annas.	Pies.
	Hindustani.	Kyem.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.		
	Mahratta.	Kem.						
	Tamil.		16	4	28	3	5	0

*Obs.*—Kyem is of a light color, is inferior to teak in strength, and greedily eaten by white ants. I am not aware of any use to which the natives apply this wood. It will however rank as a rafter timber.

Number.	Language.	Names.	Sizes procurable.				Probable Government prices per cubic foot.	
XIX.	Botanical.		Average.		Maxm.		Annas.	Pies.
	Hindustani.	Derea or Dareah.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.		
	Mahratta.	Bhera.						
	Tamil.		6½	3	10	2	6	0

*Obs.*—This wood, though of great strength, cannot, from the small size the tree attains, under the circumstances rank as a building material. I may mention, however, that it has a winding and as it were netted grain, from which, as well as the extraordinary toughness of its fibres, butchers invariably use it for chopping blocks; the sharp edge of the knife apparently having no effect on it.

# FOREST TREES AND FORESTS OF NAGPORE.

Number.	Language.	Names.	Sizes procurable.				Probable Government prices per cubic foot.	
XX.	Botanical.	Nauclea——(?)	Average.		Maxm.			
	Hindustani.	Bahdali or Behra or Bhada.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas	Pies.
	Mahratta.	Hirida						
	Tamil.		15	3	17	3	6	0

*Obs.*—This is a nice clean working wood, of a yellow color and straight grain, and has apparently but little essential oil. It is very scarce, and when obtainable, used by the natives for all purposes; in strength it ranks next to cyne, and therefore, if procurable in large quantities, and of a proper size, would be a most valuable wood. I rank it as a rafter wood.

Number.	Language.	Names.	Sizes procurable.				Probable Government prices per cubic foot.	
XXI.	Botanical.		Average.		Maxm.			
	Hindustani.	Dhewus Dhaves.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas	Pies.
	Mahratta.	Dhivus						
	Tamil.		12	2	15	2	8	0

*Obs.*—Dhaves has a light colour, is devoured by white ants, and is only procurable of a small scantling. Its strength however is considerable, and if found of a proper size, would doubtless be valuable. The young trees in this part of the country are I understand all cut down for bandy poles. It ranks as a rafter wood.

Number.	Language.	Names.	Sizes procurable.				Probable Government prices per cubic foot.	
XXII.	Botanical.	Vatica robusta.	Average.		Maxm.			
	Hindustani.	Saul.	Length in feet.	Girth in feet.	Length in feet.	Girth in feet.	Annas	Pies.
	Mahratta.	Saul.						
	Tamil.		25	4½	60	3	16	0

*Obs.*—Saul resembling Bejasar somewhat in color, differs peculiarly from it in the construction of its grain, and in its freedom from the faults, to which the other is so subject. In strength, size, and all the qualities of good timber, it appears to me to stand first of all those procurable in these territories, as a tie beam or rafter wood; but unfortunately the price, which the difficulties and expenses of transport oblige me to attach to it, compels me to rank it very low in value. It does not appear to lose its essential oil for a long time, and always exhibits small surface cracks, which widen or contract with the change of season. Nothing further need be said about this well known and excellent timber, particularly as I believe experiments have been made on it, to ascertain how it would answer for the manufacture of Gun Carriages.

Since the experiments were concluded, two other woods, the one called *Laendia*, the other *Karee*, have been brought to my notice, as likely to give good results. The first is said to resemble very closely Thevus and to be equally good. It is probably therefore a valuable timber. In the absence of specimens however I cannot offer an opinion.

Sir Richard Jenkins in his valuable report on the Nagpore Territory, states, that "the Rall or rosin tree, as also other large wood is obtained in the forests of Kakair, (probably Conkair of my map) and in the Hills North of Rattenpore." What this Rall tree is I never have been able distinctly to ascertain, though the above statement, and some vague native reports would lead to the conclusion that it is a tree of large growth, and bearing some comparison with the Saul, for which I have heard it given as a synonyme more than once. When shortly since visiting the Pachmurra Range, Dr. Jerdon and I met with a tree of the Saul family, to which he gave the name of "Vatica Toomboogia" and which the natives say furnishes a frankincense. This is probably the Rall tree, though it does not seem in those jungles to attain a large size.

For obvious reasons I have omitted making mention of the timbers of the "Mango," the "Tamarind," the "Peepul," &c., &c., which are common to this part of the country with the rest of the Peninsula.



STATEMENT II of the probable quantities in which the useful Timbers are found in the Nagpore Territories.

Names of woods likely to answer for public works with Nos. corresponding to those in Statement I.		DEOGUR BELOW THE GHATS.		DEOGUR ABOVE THE GHATS.		WYNE GUNGA OR BUNDARA DISTRICT.		CHANDAH DISTRICT.		CHUTTEESGURAH OR RYEPURE DISTRICT.				
		No. of beams of sizes.	Near what places found	No. of beams of sizes.	Near what places found	No. of beams of sizes.	Near what places found.	No. of beams of sizes.	Near what places found	No. of beams of sizes.	Near what places found			
No. I.	Teak,	15,000 R.	Koomerpain	2,000 T. B.	Pachmura Jungles including those lying from a little to the North of Oomrait to the 22½ Degree of latitude.	1,000 T. B.	Mundilla.	12,000 T. B.	Ghatkool Aheree and generally on the left bank of the Wyne Gunga to the south of those places.	10,000 T. B.	On the banks of the Jouk and other Rivers which flow into the Mahanuddee.			
No. II.	Bejasar,	2,000 T. B. 6,000 R.	Deogur, Jobnee, Jam, Doongurtal &c., &c., Jungles.	None.		500 T. B.	Within a range of 40 miles beyond Bundara.	1,000 T. B.		Impossible to estimate but all these woods are supposed to be found in great numbers.				
No. III.	Eyne,	2,000 T. B. 3,000 R.		2,000 T. B.		1,000 T. B.		1,000 T. B.						
No. V.	Seevun,	200 R.		None.		100 R.		All these woods are to be found but their number is difficult to ascertain.						
No. VII.	Hurda,	1,000 R.		1,000 R.		None.	As above.							
No. VIII.	Sirsa,	100 R.		None.		Do.								
No. X.	Thoura.	100 R.		1,000 R.		Do.								
No. XII.	Seesum,	100 R.		None.		Do.								
No. XIV.	Dhamin,	200 R.		100 R.		Do.								
No. XV.	Thoon,	None.		1,000 R.		Do.								
No. XVI.	Arjoon,	1,000 T. B. 2,000 R.		500 T. B.		Do.								
No. XVII.	Thevus,	100 R.		2,000 R.		Do.								
No. XVIII.	Kyem,	100 R.		None.		Do.								
No. XX.	Bahdah,	50 R.		100 T. B.		500 T. B.								
No. XXI.	Dhaves,	100 R.		2,000 T. B.		None.								
No. XXII.	Saul,	None.	None.	15,000 T. B.	Mundilla.	None.	30,000 T. B.							

N. B. The letters R. and T. B. here mean severally trees procurable of the sizes of Rafter and Tie Beam timber—vide Remarks, Statement VI.

## FOREST TREES AND FORESTS OF NAGPORE.

### *Remarks applying to the foregoing Statement.*

I. The Pachmurra jungles lying all about the base of the range bearing the same name, and very dense to the East and West of it, though having a great profusion of fine timber, do not apparently furnish beams of equal scantling with those situated on a lower-level. The difficulties to be contended with in clearing a path for the transport of the timbers to the Kanhan are very great: and that stream, even in the monsoon, presents so many rocky barriers, as to render it doubtful whether the beams could even then be navigated in rafts to Kamptee; and again, the expense of land carriage would put the obtaining of beams from this source out of the question.

II. The jungles line about Deogur, Jobnee, Jam, and generally the base of, and on that line of ghauts. From these hitherto the supply of jungle woods for the Department has been drawn, they furnish very fine timbers, but the difficulties of cutting and transport yearly increase from the precipitous nature of the Hills on which they grow. These Hills are for the most part trap, resting on granite, which will fully account for the circumstance. These jungles will continue to supply the Department with Bejasar, Eyne, and Arjoon for many years. Hitherto land carriage has been employed to Kamptee from the obstacles to floating which the Kanhan presents in two or three places, but a more extended communication hereafter, might warrant an expenditure sufficient to overcome these.

III. At Koomerpani a little to the East of the above, great quantities of young teak trees (estimated at no less than 15,000) have been observed; these, if carefully preserved for the next 25 or 30 years, would, after the expiration of that period, furnish nearly a century's supply for the present Kamptee demand. The difficulties of transport are at present enormous, and not worth the expense of overcoming in the young state of the jungle. But when the trees shall have arrived at their full growth, the clearing of a track to the Pench or Kanhan Nuddees, would involve an expense inconsiderable with the value of the store opened up. The price of teak thus obtained would not probably be more than 5 annas the cubic foot, which would at once raise it to the first class either as a tie beam or rafter timber.

IV. Doongerthal, more to the East and South, will yield a supply of rafter timber, and from its nearness to Kamptee at a very moderate rate. The supply is however trifling.

V. Langee, though formerly thought so much of as a place likely to yield an excellent supply of timber, has been almost completely denuded.

VI. Mundilla, from which I believe the Seonee and Jubbulpore supply of teak is drawn, though abounding in fine timber, and specially with saul, presents from all accounts too great difficulties for a supply being at present drawn from it for the Kamptee market.

VII. The Panawarras jungles, South East of Kamptee, from which my present supply of teak is drawn, are gradually getting cleared, and timber suitable for the public service can only probably be obtained for another 6 years. From the nature of the country the cutting and transport of beams is comparatively easy. Till this season we have been in the habit of carting the beams all the way to Sillapore on the Bang Nuddee there forming them into rafts and floating them with the stream to Ambora (more correctly Ghat Kooraddee), where the Kanhan discharges itself into the Wyne Gunga. With the supply however which I am now getting up, I intend trying the Koragurh Nuddee, whose ramifications I understand extend to nearly all the places where the timber has been cut. The beams after entering the Wyne Gunga, will require to be drawn up against the stream to Kamptee, but I am in hopes that the expense will notwithstanding be less than that of former years.

VIII. I have introduced the probable supply of the Raepoor or Chutteezghur jungles in respect to teak and saul (vide statement) more as a matter of curiosity, than for any useful end to which it can at present tend. The Jouk, Leo, and other Nuddees which flow into the Mahanuddee, may at a future period bring timber from the vast forest in rear to the neighbourhood of the Baugnuddy, and thence to Kamptee; but, at present, it is useless to speculate on such a case presenting itself.

IX. Boojung Row's Zumindaree, from which the future supply of teak must be drawn, is capable of affording an unlimited supply, but accurate information is wanting.



## GALLS.

(800) FELAMERZ, the son of Roostum, the hero of Persian Romance, was defeated by Behram near the fort of Fessa, between Shiraz and Darab. Behram caused Felamerz to be hanged, and his tomb existed in the village, until, it is said, a European traveller removed it away, as a relic.

## GANGES CANAL.

### (801) FUMITORY.

Skahtra, PERS. and DUK. | Pittpapra, HIND.  
Bucklut ul melic, ARAB. | Fumaria Officinalis, LIN.  
*Ainslie's Mat. Med. p. 16.*

(802) FURSAKH. PERSIAN, a measure of  
of  $3\frac{1}{2}$  English miles.

## G.

(803) GABA-GABA, is the stem of the leaf of the sago palm, much used throughout the Moluccas in buildings and fencing. *Atap* is thatch made of the fringe of palm leaves, doubled down and sewed on sticks or lathes of bambu.—*Journ. of the Ind. Arch. Vol. VI. No. 6.*

### (804) GAINGOOL.

Gaingool, HIND. | Tati kengaloo, TEL.  
Panam calang, TAM.

Is the young plant or shoot of the palm tree (*Borassus flabelliformis*). It is boiled and eaten by common people. To obtain it they dig a hole, about a yard deep, in which they put the stone of the fruit and cover it up with earth: about a year afterwards it is dug out and the plant or shoot then produced is called Gaingool.

(805) GALANGAL. This root is sent from China to India; there are two sorts, the greater and the smaller, obtained from different plants, the best of which is the smaller, procured from the *Maranta galanga*. This is of a reddish color, about two inches long, of a firm texture though light, and possessing an acrid, peppery taste, and a slight aromatic smell. The larger is from a different plant (*Kempferia galanga*), and inferior in every respect. Both are used as spicery, and to some degree in Europe as well as India.—*Williams' Middle Kingdom, Vol. II. page 400.*

### (806) GALEDUPA INDICA.

Karunjuka, SANS. | and BENG.  
Kutanja or kenja, HIND. | Ganuga, TELING.  
*Roxb. Fl. Ind. Vol. III. page 239.*

### (807) GALLS. •

Machakai TAM. | Mazoo, PERS.  
Maaphul, DUK. | Majaknee, MALAY.  
Ufesa, ARAB. | Majuphal, SANS.  
Majoophul, HIND. | *Ains. Mat. Med. p. 165.*

Some years ago in the dispensaries of Bengal, Gall nuts were tried extensively in powder with infusion of Cheretta, but the general result was unfavorable, conveying the impression that the mixture was not equal to the common country febrifuges.

The subject was brought to the notice of the Madras Medical Board in 1853, by Assistant Surgeon Timmins, in charge of the Bhopal Contingent and Agency, and the result of his treatment was that "during the 12 months, from 1st

October 1851 to 30th September 1852, the whole of the cases of Fever, with one or two exceptions in the Hospital of the Bhopal Contingent, were submitted to this treatment (gall powder and infusion of chiretta) and all yielded to it with the exception of three cases of Quartan Fever, one of Remittent and one of Continued Fever, in which the concomitant symptoms being severe, he was necessitated to employ other remedies."

The cases he treated by galls and chiretta, were 244. By quinine and other means, five average No. of days in hospital to each patient 8.95. In cases treated the previous year by quinine during a corresponding period, the average No. of days in Hospital was 9.91.—*Dr. Cornish in Indian Annals No. VII. page 115.*

(808) GAMBIR, is an Extract from *Uncaria Gambir*, and has been recommended by Mr. T. C. Drysdale, of Singapore, as a preservative of timber exposed to water, or canvas. The gambier may be in solution, in water, but if applied to ships' bottom, it should be in the form of a composition of chunam, gambier and dammar oil. It is also recommended to be applied in house building to protect the beams from the white ants, and in ship building as a composition on the butts, and on the outside of the timber previously to planking. Gambier may also preserve timber from dry rot.—*Jour. Ind. Arch.*

(809) GANDASULI. Marsden gives this as the *Hedychium coronarium* of Linnæus, and adds that its flowers are worn as ornaments in the hair, and in the enigmatical language of flowers stand for inconstancy.—*Jour. Ind. Arch. Vol. V, No. 8, August 1851.*

(810) GANGES CANAL. This is unquestionably the greatest work of irrigation ever accomplished in any tropical country at any epoch of history. It cost a million and a half sterling, nearly all of which was expended during the seven years of Lord Dalhousie's administration and the main stream was opened on the 8th April 1854. It extends over 525 miles in length; measures 170 feet in its greatest depth. Its length is five-fold that of all the main lines of Lombardy united, and more than twice the length of the aggregate lines of Lombardy and

Egypt together, the only countries in the world whose works of irrigation rise above insignificance. It nearly equals the aggregate length of the four greatest canals in France: greatly exceeds all the first-class canals of Holland put together and is greater by nearly one-third, than the greatest navigation canal in the United States of America. When completed, it will be 900 miles in length, and it is estimated that the area which may be irrigated by its waters, will not be less than 1,470,000 acres.

(811) GANONG, generally called Ayen Panas, hot springs in Nainong. All the hot springs of the Malayan Peninsula, and some of those in Sumatra, occur in swampy flats. That of Ganong occurs at or close to the line up to which plutonic action has converted the rocks of the district into granite.

(812) GARDENS. In Mr. Wilson's specimens of the Hindoo drama, there are plays called "the Necklace," and "the Toy cart," which he translated from the Sanscrit, containing beautiful allusions to gardens in India.

"The garden is now most lovely. The trees partake of the rapturous season, their new leaves glow like coral, their branches, wave with animation in the wind, and their foliage resounds with the blythe murmurs of the bee. The bakula blossoms lie around its root like ruby wine; the champaka flowers blush with the ruddiness of youthful beauty; the bees give back in harmony the music of the anaclets, ringing melodiously as the delicate feet are raised against the stem of the asoka tree."—*The Necklace, Wilson's Specimens of the Theatre of the Hindoos, Act 1, page 272.*

"Look round the garden with these stately trees,  
Which daily by the kings command attended,  
Put forth their fruits and flowers  
And clasped by twining creepers, they resemble  
The manly husband, and the tender wife."—*Toy Cart, Act 8, page 125. Specimen of the Theatre of the Hindoos, translated by Mr. Wilson. —Ibid.*

This play is supposed to be written by a King, named Sudraka; over what kingdom he reigned, it is not ascertained with certainty. This play is, however, of considerable antiquity, and Mr. Wilson remarks in his introduction to the 'Toy Cart,' page 9, that it may be safely attributed to the period when Sudraka, the sovereign, reigned, whether that be reduced to the end of the second century after Christ, or whether we admit the tradition, chronologically, and place him about a century of our era. These specimens of the Hindoo drama are certainly curious. We are struck with the little change in the customs of the Hindoos since the plays were written.—*Chow Chow, p. 218.*

(813) GEOLOGY OF INDIA. Mr. Oldham, at the request of the President, proceeded to give some account of the results he had arrived

at from the investigations conducted by himself and his assistants in the Geological Survey in Central India during the season of 1855.

Briefly referring to the many valuable papers which had been contributed by previous observers illustrative of the Geology of Central India, and to the fact that few parts of the immense empire of India had excited more interest and attention than the districts adjoining the Nerbudda river, Mr. Oldham pointed out that the great thickness of sandstones and associated beds, which formed the mass of the Vindhya range, was the most striking and remarkable feature in that country. This had been spoken of as "the sandstone," "the great sandstone, &c." Capt. Franklin had referred it to the age of the middle portion of the new red sandstone of European geologists. Jacquemont, for the greater part at least of the area, assented to this view. Other observers had given it a different position. Captain Sherwill for instance had mapped it as old red sandstone, although giving it the somewhat anomalous position of resting upon "mountain limestone." In 1854, Dr. Carter of Bombay had published a carefully compiled summary of the Geology of India, in which the whole of this sandstone and associated beds was referred to the same age as the coal bearing rocks of Bengal, all which he classed with the oolitic or jurassic epoch of European geologists, and he took his typical groups, and the names for his subdivisions from localities in this district. He divided the whole into three sub-groups, which he called—Tara, Kuttra, and Punnah groups, in ascending order; the coal being supposed to belong to the central or the Kuttra group. And this classification he applied to other districts. Again on the geological map of India, recently published under the sanction of the Court of Directors, by Mr. Greenough, all this immense area, stretching from the Soane to near Mundlairsir in the Nerbudda, was placed under the general head of oolitic and diamond sandstone and limestone.

The researches of the Geological Survey of India, had extended over a considerable portion of this district during the past season, and although much remained to be done in working out the details, as might be anticipated in so large an area, sufficient had been learned to enable a few great conclusions to be drawn. It was at present impossible to give all the detailed illustrations of these, and they would therefore be only stated as briefly as possible. The importance of them would at once be recognised by those who had given any attention to these enquiries, tending as they did to modify existing opinions, and to alter the colouring of all our geological maps in the most marked and extended way.

Their late investigations had shewn—that there was good evidence of a great faulting, accompanied



by much disturbance mechanically, and by much alteration chemically, in the rocks (more especially to the south of this fault), which passed along the main line of the Nerbudda valley, along the continuation eastward of this line down the valley of the Soane; and thence across Behar, where the continuation of the same rocks formed the Kurruckpoor hills.

That there was a high probability that this line of dislocation was continued to the east by north, up or towards the valley of Assam; its main direction being E.  $15^{\circ}$  to  $18^{\circ}$  N. corresponding with the main direction of the Vindhya range and the Khasi hill range.

That south of this dislocation the great group of sandstones, shales, &c. forming the Vindhya hills, was almost entirely absent, (unless it were admitted, see below, that the highly metamorphosed rocks there seen were the continuation downwards of the same series greatly altered.)

That this great group was altogether of a different character and of a more ancient epoch than the beds associated with the coals of Bengal and of Central India. (The latter resting quite unconformably on the former.)

That from the absence of organic remains, there was as yet no evidence on which to base a reference of this group to any established epoch of European geology. (*It might be Cambrian.*)

That the names hitherto assigned to this group and its subdivisions being based on erroneous views of position, and therefore tending to erroneous conclusions, must be abandoned.

For the whole formation Mr. Oldham proposed the name *Vindhyan*, stating that it appeared most desirable that the general *physical* relations of the rocks should be determined, and the several groups established on such evidence derived from the actual arrangement and sequence of the rocks rather than from some fancied or imperfectly established analogies derived from partially collected or partially examined organic remains. When the actual sequence of the various groups had been established, wherever this was possible, the organic evidence would be valuable. Applying the name *Vindhyan* then to this great group as being best seen in the well exposed scarps of the Vindhyan range, he would propose as distinctive of the subdivisions in ascending order, the names Kymore, Rewah and Bundair. These minor groups were only given provisionally, as it was possible that more detailed examination would shew that there was only a two-fold division, and that the Rewah limestone and Bundair sandstone were only repetitions of the Soane valley limestone and sandstone produced by faulting.

Resting unconformably upon the Vindhya formation, there was a considerable thickness of sandstones, shales and coals, (in Central India much disturbed, and traversed by trap dykes).

ceeded some thousand feet. In these beds occurred numerous fossil plants, which thoroughly identified these rocks with the coal-groups of Burdwan, of Hazareebaugh and of Cuttack. No *additional* evidence tending to settle the doubtful question of their true geological epoch had been obtained, nor on the other hand any thing to shake the probability of their Jurassic date. Taking it as proved that the strata at Kotah, from which the fish and Saurian remains had been obtained, were the same with those of Kamptee near Nagpore, the strong *Permian* analogies of the Saurians (*Brachyops*) ought not to be overlooked. But the identity of the strata was, he thought, still to be established.

Resting again quite unconformably upon these rocks was found another series of sandstones, often ferruginous, generally speaking irregularly though strongly bedded, and of great thickness. These formed the lofty and boldly scarped range of the Puchimurry or Mahadewa hills. And to this group Mr. Oldham proposed to give the name of Mahadewas. No organic evidence had been found in these. In one or two places they seemed to pass upwards conformably into sandstones holding remains of large mammalia (and probably of Sewalik date.)

This group was markedly separated from the coal-bearing group below, and as compared with it was also characterized by the comparative absence of trap dykes or other exhibitions of igneous rocks.

Upon these, in parts of the district, rested the great spreading sheets of trap rocks forming the continuation of the immense basaltic field of the Deccan. Four and five distinct flows could readily be traced in places. And adverting to the occurrence of the beds containing Shells (*Physa*, *Paludina*, *Unio*, &c.) which were found between these flows (Intertropean lacustrine formation, of Carter) *so far as the evidence derived from the Nerbudda district was concerned*, it appeared that there was no reason to suppose that they were confined to any one layer or flow, and still less reason to suppose that their present aspect and condition was due to the intrusion of the igneous rocks from below (as advocated by some), but that on the other hand there was much ground for thinking that this alteration was entirely due to the subsequent overflowing of the heated mass of the trap above, and to the disturbances consequent on the exhibition of such powerful force as must have accompanied the production of these immense flows of lava. These shelly beds seemed to have been formed by tranquil deposition during the intervals between the successive flows of igneous rock, and to have been broken up indurated and baked by the succeeding outbreak. Mr. Oldham stated, that in making this remark, he wished to say that he had not had the oppor-

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Messrs. Hislop and Hunter, near Nagpore, from which those careful observers had drawn their conclusions, but that his view had been derived solely from the facts presented to him in other places.

The detailed examination of the greater part of the Nerbudda district was due to the exertions of Mr. J. G. Medlicott.

The following would therefore give a summary view of the groups here proposed in descending order, neglecting for the present all the more recent divisions.

Groups.	Mineral character.	Age, &c.
Mahadewa,...	Sandstones, with a few shaly beds, for the most part pebbly, often striped with ferruginous bands.	Geological age unknown, a few vegetable fossil stems, &c.
Damoodah,...	Shales, sandstones, coal, for the most part thinly bedded and regular, often greatly cut up by trap dykes. <i>In Out-tack however there are no trap rocks.</i>	Age not thoroughly decided probably Jurassic, fossils chiefly vegetable, name taken from the locality where series is most fully developed.
Vindhya. Bundair, Rewah,...	Sandstones and shales. Limestones, shales and sandstones,...	Age unknown, probably very ancient, seen all along Vindhya range, into Behar and to the Ganges at Monghyr. Probably also in the Khasia Hills possibly only two subdivisions.
Kymore, Sub-Kymore	Sandstones and limestones and shales,...	
	Crystalline limestone pseudo-gneiss (name proposed by H. B. Medlicott, Esq.) micaceous schists, and quartzites, red and green, and white.	Highly probable, though not yet thoroughly proved, that these are only the continuation downwards of the Vindhya groups subsequently altered.

Granite, gneiss hornblende-rock, greenstone, &c.

Another district of considerable interest had also been examined during the past season, by Messrs. Blanford and Theobald, and the results arrived at under their careful scrutiny had been strongly confirmatory of the results given above. The Cuttack, or Talchere coal-field gave the following section, descending :

*Allyvium, laterite, &c.*

1.—Upper grit series,—unfossiliferous—quartzose grits and coarse sandstones, with occasional red shales; pebbly throughout, and near base

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2.—Carbonaceous shale series, fossiliferous, consisting of

(a)—Blue and lilac shales, micaceous; white speckled sandstones ironstones, about 1500 feet thick.

(b)—Carbonaceous shales containing thin seams of coal (8 inches) irregularly dispersed through them, about 200 feet.

(c)—Shales and coarse white sandstones, the latter predominate in lower portion, 100 to 200 feet.

(3)—Lower shale and sandstone series, annelid tracks, consisting of

(a)—Blue nodular shales, generally arenaceous.

(b)—Fine sandstones, much jointed and "tesselated."

(c)—"Boulder bed," containing numerous boulders of gneiss and granite frequently 5 to 6 feet across—in a fine argillaceous or arenaceous rock, often rippled, sometimes replaced by a coarse sandstone.

Each of these series rested unconformably on that beneath it.—*Beng. As. Soc. Jour. No. III. of 1856.*

*On some Additions to the Knowledge of the Cretaceous Rocks of India, by Thomas Oldham, LL. D., F. R. S., M. R. I. A., F. G. S. &c. Superintendent of the Geological Survey of India.*

At the meeting of the Society for the month of May 1857, Mr. Henry Blanford and myself were present, with the intention of laying before the Society, a brief notice of a very important discovery bearing on the Geology of India which had not long previously been made. This was the fact of the occurrence of rocks of the Cretaceous epoch in the western portion of the Nerbudda district. And the specimens illustrative of the intended communication were laid on the table. The attention of the meeting on that occasion, having been fully occupied by other matters of interest, and importance, which came before it, time did not allow of this geological communication being brought forward, and as both Mr. Blanford and myself shortly afterwards left Calcutta, the subject was not again brought before the Society. I am, however, desirous of recalling these facts, from the circumstance that the same discovery has subsequently been brought forward elsewhere, and I desire to place on record the facts of the case, more fully than has hitherto been done, that the friend whose zeal first led to the discovery may be rewarded by obtaining full merit for his intelligent research.

"All those who have given any attention to the study of Indian geology, are aware that previously to last year, rocks of the cretaceous epoch, were only known to occur, in the South



limits of which were supposed to be near Trichinopoly on the South, and near Pondicherry on the North. The true relations of this band of cretaceous rocks, have never been fully investigated, but a very beautifully preserved, and numerous suite of fossils had been collected from them by Messrs. Kaye and Brooke Cunliffe, of the Madras Civil Service, which were presented to the Geological Society of London. The description of these fossils was undertaken by the late Professor Edward Forbes, and a most valuable and instructive memoir, fully illustrated with excellent plates, was published in the 3rd part of the 7th vol. of the Geological Transactions of London.

After giving a detailed description of the species found, Professor Forbes entered on a discussion of the inferences to be drawn from the Fauna thus represented. It must be borne in mind that previously to this publication, the occurrence of any rocks, representatives of the cretaceous epoch in India, had often been denied, and that there was no fixed geological horizon to which such a new discovery could be referred. The physical relations of the rocks containing the fossils to any other recognised groups were unknown, and it was only from a discussion of the organic remains contained in them, that any just inference as to their geological age could be attained.

Professor Forbes entered fully into this discussion, and from a careful analysis of the evidence arrived at the conclusion, that all the beds from which fossils had been obtained were parts or members of one and the same series, and that that series was equivalent to the cretaceous series of Europe; the deposits at Trichinopoly and Verdachellum, being probably equivalent to the upper greensand and gault divisions of that series; the deposit near Pondicherry, being equivalent to the Neocomien, or lower greensand.

During a brief visit to Madras in the autumn of 1856, I was indebted to the kindness of Mr. Brooke Cunliffe, one of the original labourers at these deposits, for a valuable collection of these fossils chiefly from the Utatur locality. This collection at once proved the correctness of the closing words of Professor Forbes' valuable paper that "Verdachellum and Trichinopoly will doubtless yield many more species than have yet been brought to Europe," for in it were many beautiful and well marked forms previously undescribed. But it also showed conclusively, that a still further and more careful research was requisite, before it could be supposed that anything like fair data had been obtained, for arriving at trustworthy conclusions as to the true character of the Fauna of this period in Southern India. The relative abundance of species, and even of genera seemed in many respects very different from that which the original collection gave, and it appeared probable that much

of this difference in different localities was the result of a difference in depth in the sea at the time of deposit, and not of difference in time—a result not in accordance with the conclusions arrived at by Professor Forbes.

Among the small collection presented by Brooke Cunliffe, Esq., not less than 93 species were distinguished. Of this large number only 33 were known to Professor Forbes from the original collection; leaving an addition to the Fauna known up to that time from these rocks of 60 species. Without exception these 60 species all tended to confirm the opinion of Professor Forbes, that these rocks were of cretaceous age. A summary is given below of these additions generically, reserving the details of specific description until it is possible to prepare illustrations of the fossils. But a group or two may be referred to, in illustration of our remarks. Thus, taking the several well marked sections of the great genus *Ammonites*, among the large addition to the known catalogue of species, which Mr. Cunliffe's collection has given, we have none of the *Fimbriati*, an oolitic and cretaceous section; none of the *Flexuosi*, also a lower cretaceous section; none of the *Dentati*, also lower cretaceous; none of the *Armati*, an upper oolitic section; none of the *Lævigati*; while on the other hand, of the *Cristati*, a section essentially cretaceous, we find one; of the *Olypeiformi* also a cretaceous section, one: of the *Heterophylli* five, and all of the cretaceous subdivision of this section; of the *Ligati*, a group essentially cretaceous, not less than ten.

Of *Nautilus*, a genus having a larger development in the upper than in the lower beds of the cretaceous, we have three allied to other cretaceous forms; of *Belemnites*, confined to the upper portion of the cretaceous group, one. And other instances might be given. These will however suffice to shew, that a vast addition to the cretaceous Fauna of India still remains to be worked out.

I would add that Mr. H. F. Blanford, with others, is at present engaged in making out the relation of these rocks, and I confidently anticipate, that much light will be thrown upon the subject, by the careful examination of the Officers of the Geological Survey in that district.

*Abstract of fossils from Utatur near Trichinopoly.*  
*Zoophyta.*

<i>Zoophyta.</i>		
Turbinolia,		
	Species previ- ously known.	Species unknown
<i>Echinodermata.</i>		
Brissus, .....	3	2
Nucleolites, .....	0	1
Holaster, .....	0	1
<i>Crustacea.</i>		
Cancer (?) .....	0	1
<i>Mollusca. (Acephala.)</i>		
Inoceramus, .....	0	3

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	Species previously known.	Species unknown.
Pecten, .....	2	0
Ostrea, .....	0	4
Gryphæa, .....	2	1
Pinna, .....	0	2
Arca, .....	0	4
Pectunculus, .....	0	1
Modiola, .....	1	1
Trigonia, .....	1	1
Solecurtus, .....	0	1
Cardium, .....	0	2
(Gasteropoda),		
Natica, .....	1	0
Trochus, .....	1	0
Pleurotomaria, .....	1	0
Voluta, .....	2	0
Phasianella, .....	0	1
Strombus, .....	1	0
Tornatella, .....	1	0
(Cephalopoda)		
Baculites, .....	2	0
Ptyoceras, .....	0	1
Hamites, .....	2	4
Turrilites, .....	1	1
Ammonites, .....		
Cristati, .....	0	1
Lævigati, .....	1	0
Clypeiformi, .....	0	1
Heterophylli, .....	1	5
Ligati, .....	3	10
Nautilus, .....	1	3
Belemnites, .....	0	2
Belemnitella, .....	0	1
<i>Annelida.</i>		
Serpula, .....	0	2
<i>Pisces.</i>		
Odontaspis, .....	1	0
Otodus, .....	2	0
Lamna, .....	0	1

The above list refers solely to the collection of fossils presented to the Geological Museum by Brooke Cunliffe, Esq.

**NERBUDDA DISTRICT.**—During the season of 1855-56, while engaged in the examination of the valley of the Nerbudda, I had the pleasure of meeting Captain R. H. Keatinge, Assistant Political Agent for Mewar, at Poonassa. Among other things our conversation turned upon the coralline limestone, of which the ancient town of Mandoo had been built. I took the opportunity of pointing out the extreme interest attaching to this limestone in a geological point of view, and the utter ignorance under which we rested as to its age or relations. It had been very ingeniously, and correctly inferred by Dr. Carter, in his carefully compiled "Summary of the Geology of India," that the limestone used at Mandoo had been derived from near Baug or Bagh, which inference I pointed out to Captain Keatinge in Dr. Carter's paper, telling him at the same time my own impression that it would

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prove to be, not ~~oolitic~~, as provisionally supposed by Dr. Carter, but of the nummulitic age. Captain Keatinge says:

"Higher up at Surbaperee on the Maan, I thought I traced the following succession, (ascending) a light greenstone metamorphic or volcanic; a soft sandstone, very fine grained and white; compact limestone, bluish white; and then the coral limestone, the latter only containing corals. The compact fine limestone, is found at intervals all over the jungle, and has been very largely used for lime in the Mandoo days; the old kilns are without number. Now as to the fossils, I found them wherever an edge of stone lay over a convenient mud bed to retain them. The *Echinida Micraster coranguinum* (This is a mistake. It is a *Brissus*), were in great plenty (the Bheels call them Paunchia from their five marks) and what I suppose to be *Pecten 5-costatus*. (It is so). *Plagiostoma spinosum* and *Terebratula octoplicata* were numerous, the latter the most numerous and in best preservation, pieces of a large finely marked *Echinus* (*Cidaris*) and I have a half one of the same sort of which I send you a sketch. I have kept it to show the natives what I want on some future occasion. There is also a rude impression on a stone I have got, of a very large shell, say six inches long. *Inoceramus*?

On receipt of these fossils, they were at once looked to, and it was found that although some of these specific distinctions were not correct, they entirely supported the conclusions of Captain Keatinge; and that here to the West of Mhow and Indore, in a country where such was before altogether unknown, there existed extensive beds of the cretaceous series. The importance of this fact, in its bearing on all reasonings as to the physical geography of the country at former periods, will be obvious to every one who has considered such questions, and its influence on the question of the still doubtful age of the rocks in the adjoining district was also great. Eagerly therefore I congratulated Captain Keatinge on his valuable discovery, and urged a further exploration of the field. And I had the pleasure of hearing the result in the beginning of the year. (March 1857.) Captain Keatinge had, in company with Mr. Blackwell, Mineral viewer to the Bombay Government, revisited the Baug district in the month of January, and has favored me with an extract from his journal, which being brief, and full of interest, I give entire.

From these details it will be evident that to Captain Keatinge alone is due the merit of having first distinguished these fossils as cretaceous, and to him also belongs the merit of having most zealously and under considerable difficulties, collected a very tolerable series of them.

I shall not here discuss the conclusions arriv-



ed at by Dr. Carter in the notice referred to, in the Journal Bombay Asiatic Society, No. XX. July 1857, page 621, that these beds are truly neocomien, because I think we have not got any sufficient data to reason upon, I feel confident that the hasty reference of any group of rocks, to some acknowledged European *subdivision* based upon the occurrence of 3 or 4 ill-preserved and ill-identified fossils is both unphilosophical and injurious. The evidence here is abundantly good to say that these rocks represent the cretaceous era, but altogether insufficient to enable one to refer them to any subdivision of that great series.

Reserving, as before, the detailed specific description of these fossils, a generic summary is here given of the number, &c.

*Summary of Fossils collected at Bang by*

*Captain Keatinge.*

	Species.
<i>Corallines.</i> .....	4 or 5
<i>Echinodermata.</i> <i>Cidaris</i> , .....	1
<i>Echinus</i> , (species) .....	1
<i>Brissus</i> , .....	2 or 3
<i>Cyphosoma</i> , .....	2
<i>Mollusca.</i> <i>Acephala Pholadomya</i> , ....	1
<i>Venus</i> , .....	1
<i>Cardium</i> , .....	4
„ <i>altum</i> . Sow; <i>hillanum</i> , or very closely allied and two others.	
<i>Arca</i> , .....	1
<i>Modiola</i> , .....	1
<i>Mytilus</i> , (typicus, Forbes.)	1
<i>Pecten</i> (Janina) .....	3
<i>P.</i> ( <i>5. costatus</i> common.)	
<i>Plicatula</i> , .....	1
<i>Inoceramus</i> , .....	1
<i>Terebratula</i> , .....	1
<i>Gasteropoda.</i> <i>Rhynchonella</i> , .....	1
<i>Natica</i> , .....	1
<i>Turritella</i> , .....	1
<i>Cerithium</i> , .....	1
<i>Triton</i> , .....	1
<i>Voluta</i> , .....	2

*Cephalopoda.*

Ammonites of the *Rhotomagensis* Section, 2

I had hoped to have procured during the past summer an extended series of fossils from this locality, and with a view of having it thorough-

ly examined, Mr. Wm. Theobald, Junr. was deputed to remain in that district, after his field work of last season had been concluded in the Nerbudda Valley. But the very disturbed state of all the country in that neighbourhood has rendered it impossible to carry out these views. Mr. Theobald, after considerable risk has escaped unhurt, but the examination of the Bagh country, must be deferred to a more favourable opportunity.

*On the age of the coal strata in Western Bengal and Central India.—By Rev. STEPHEN HISLOP, Nagpur.*

The age of the coal field of Newcastle, Australia, has been a subject of discussion to as great an extent almost as the geological position of our Indian carbonaceous strata. For my own part, I have been inclined to acquiesce in the view of McCoy, who, in the An. and Mag. of Nat. Hist. vol. XX., endeavours to prove that the beds with vegetable and those with animal remains belong to different formations,—that the former are Oolitic, while the latter must be referred to Palæozoic times. Not having his paper at present in my possession, I cannot now adduce the arguments by which he seeks to establish his opinion; but it is of little consequence, as the evidence, which I shall bring forward, in the sequel, on the age of our Indian coal measures, will be independent of the Palæozoic or Mesozoic character of those of N. S. Wales.

Perhaps the most interesting part, in a section of the rocks of Central India, is the junction of the thick bedded sandstone above with the laminated strata below. The latter, however various they may be in different localities as regards their lithologic and sometimes even their palæontologic features, may readily enough be distinguished by their relation to the superior beds, whose identity again is sufficiently attested by the iron bands, which run through their mass. This ferruginous sandstone is well developed at the Mahadeva Hills, in the north of the province of Nagpur, in the vicinity of the city itself, and at Kota on the Pranhita, in the dominions of the Nizam. The subjoined sections represent the succession of the strata at these places respectively, as far as they are known:

1.—Mahadeva Hills.

2.—Near Nagpore City.

3.—At Kota.

85 feet.	Massive sandstone with iron bands.	75 feet.	Massive sandstone with iron bands.	80 feet.	Massive sandstone with iron bands.
	Carbonaceous and other shales with ferns, vertebra, phyllothea, &c.		Laminated argillaceous sandstone with ferns, vertebra, phyllothea, &c.		Argillaceous limestone.
	Sandstone.		Sandstone.		Bituminous shales with fishes.
	Green shale.		Green shale.		Sandstone.
45 ft. 25 ft. 15 ft. 2,000 ft.		40 ft. 30 ft. 30 ft. 15 ft. 100 ft.	Red shale.	27 ft. 25 ft. 23 ft. 11 ft. 8 ft. 4 ft. 9 ft. 500 ft.	Bituminous shales with argillaceous limestone.
			Crystalline limestone.		Limestone.
					Clays with limestone.
					Red shale.
					Limestone.

In the preceding sections the dimensions depend partly on inference with the exception of those of No. 3, which were ascertained exactly by the measurement of the late Dr. T. L. Bell. They are, however, I believe, sufficiently accurate for the purpose for which they are given. That purpose is to exhibit the similarity, which exists among all these sections. Immediately under the upper sandstone, laminated rocks are seen in all. In section 1st, the shales are bituminous and carbonaceous, while in section 2nd, they are of argillaceous sand. But that they are of the same age, there can be no doubt, as many species of fossils are common to both. In comparing sections 1st and 3rd, we find that the latter instead of having the limestone all collected in the lower part of the section, as is the case at Nagpur and in many parts of the Nizam's country, has it interstratified with the shale; but leaving this peculiarity out of view, we perceive that in it the bituminous strata occupy the same position as in section 1st. The difference in organic remains between these two sections is more than counterbalanced by their agreement in the sequence of the inferior rocks, which (still omitting the interstratified argillaceous limestone from section 3rd, and choosing section 2nd as being better known for comparison with it, instead of section 1st) gives us in descending order sandstone and clay, red shale and limestone.

Now, if the fern-bearing coal shales and laminated sandstones of this province be the same as the fish-producing bituminous shales of Kota, then the light, which the last mentioned beds afford regarding their own age, may be cast back on the other two. It is satisfactory to find, that the evidence supplied by the Kota fossils is that of animal remains. The fishes that rewarded the researches of Drs. Walker and Bell have been pronounced by Sir P. Egerton to be true Oolitic forms, and probably of the age of the Lias; and therefore our vegetable organisms can be no older. To make this part of the evidence complete, and with the view of introducing some remarks on the testimony of our fossil plants, I may here mention, that between Nagpur and Chanda, at both of which places the upper sandstone has the usual iron bands, and the lower laminated beds the common vegetable remains, there is a district with Mangali as the centre (sixty miles S. of Nagpur) where the superior sandstone is less ferruginous, and the inferior or laminated beds are coloured by iron of a deep brick red. In the latter strata, where, from the analogy of the country both South and North of them, we should expect an abundance of ferns and stems, the remains of reptiles, fishes and entomostraca predominate, while the few vegetables that are found, are generally very different from those occurring in other parts of this territory. And yet from the position of this

sandstone I have very little doubt that it is the same as that of the more ordinary appearance. The teachings of its Fauna are interesting. The skull of a Labyrinthodont, named by Owen *Brachyops laticeps*, might suggest for it a Triassic or even Carboniferous age, but the plentifulness of scales of lepidotoid fishes forbids us to assign a more ancient epoch than the Jurassic; and the conclusion is unavoidable, not that our laminated sandstone is older than the age we have attributed to it, but that the Labyrinthodont family has come down to a more recent period than is generally believed.

But now it is time to inquire what we are to learn from our fossil plants, regarding the age of the carbonaceous shales and laminated sandstone of this province.

The testimony of vegetable remains I do not reckon of trifling value. When they belong to a large genus like *Pecopteris*, which has run through many successive changes of the earth's surface, then the information they supply is not very precise. But the very same may be said with greater force of the genus *Terebratula* in the Fossil Fauna. And I have observed that, even among plants of an undecided character as regards genus, there is generally some form, which distinguishes the species of one epoch from those of another. Besides, a geological age may be known from the abundance of a genus or family of plants at one period as compared with others. Though the discovery of a single species might not decide the question, yet if the genus, to which it belongs, culminates in a certain formation, and a particular stratum presents an unusually large proportion of that genus, then some idea may be formed of the age of that stratum. Such is the case with the entire fronded ferns. They reached their maximum development in the Jurassic period, as the Oolite of Scarborough, Stonesfield, and, according to H. Miller's recent researches, of the North of Scotland, plainly shows; and one of them, the genus *Tæniopteris*, which is so fitly associated in our carbonaceous strata with *Glossopteris* and *Cyclopteris*, is almost confined to the Oolite, there never having been an example of it hitherto met with in the true coal measures.

Having said thus much on the general principle, I proceed to apply it to special instances. There are three localities with which our strata admit of comparison—Stonesfield and Scarborough in England, and Richmond in Virginia U. S. The slate at the former British locality and the carbonaceous shales and sandstones at the latter, are universally acknowledged, I believe, to be Lower Oolitic; while the American coal formation referred to, is generally assigned to the same era. Now the connexion between our strata and the Stonesfield slate seems to be, the abundance of *Tæniopteris*, and a resemblance among the fruits or seeds. The similarity to



Scarborough consists in the presence of what Lindley and Hutton call *Equisetum laterale* with its deciduous discs at the joints of the stem, a plant, which to the best of my knowledge has hitherto been discovered nowhere else. The relation to Richmond is more intimate still. *Teniopteris magnifolia*, found there by Prof. W. B. Rogers, appears to be specifically identical with one of the same genus here; and the descriptions given of the Virginian *Calamites* erroneously so-called, correspond exactly with the *Phyllotheas* of Central India. And if we are to count the strata of Mangali among the representatives of our carbonaceous shales, then they furnish other two points of comparison with the Richmond coal basin, viz. in a *Kuorria*, and another stem, resembling a *Lepidodendron*, but which may be called an *Aphyllum* or perhaps *Aspidiaria*, I might here add a third link of connexion between those Mangali and Richmond beds, viz. the occurrence of two forms of *Eatomostraca* belonging to the genus *Estheria*. But in this instance, the evidence of the Fossil Fauna is not so distinct as that of the ancient Flora. The inference to be drawn from a particular species of *Teniopteris* being common to the rocks of Eastern Virginia and Central India is, in my opinion, conclusive as to their contemporaneousness; but not so that drawn from the discovery of *Estheria* in both, as the genus just named, after having been too frequently taken for a mollusc, is now recognised in the carboniferous formation, and, I believe, the old red sandstone, as well as in the Lias, the Oolite, and the Wealden. Judging from Sir C. Lyell's figure, there is a great agreement between his species and ours, but when Rupert Jones, one of our best authorities in this department, is able to pronounce upon them, his decision will set the matter at rest.

I suspect that a good many other instances of resemblance between our fossil plants and those of admitted jurassic strata might be pointed out; but materials as yet are deficient. There is still wanting a revision of our ancient flora, discriminating between true Carboniferous and Oolitic types. For example, how long have all furrowed stems in Europe and America, and I need not add India also, been referred to *Calamites* and more rarely *Equisetum*, whereas many of them, viz. those characterized by the absence of tubercles, and the opposite arrangement of their sulci, must undoubtedly be classed under the genus *Phyllothea*. To establish some such clear distinction as this, is a step towards the determination of the age of the rocks, in which those stems are respectively met with. While an alternate furrowed tuberculated stem is never found in the Oolite, on the other hand, the stems destitute of tubercles and with opposite sulcation almost exclusively occur in that formation.

Hitherto my remarks have been confined to the

carbonaceous strata and laminated sandstone of Central India. In now including the coal measures of Bengal in my comparison, I must bespeak indulgence, as I have personally examined none of the strata or fossils of that part of India, and must depend wholly on the descriptions and a few figures that have already been published.

By "coal measures of Bengal" of course I do not understand those on the N. or N. E. of Calcutta, some of which doubtless belong to a Tertiary age; but I mean those on the W. and N. W. of the Indian Metropolis, of which the strata in the Damuda basin may serve as a specimen.

These strata, I consider to be the same as what we have in the north of this province, and therefore, if my previous reasoning has been sound, they also are to be regarded as jurassic. The grounds of my identification are 1st, similarity in organic remains, and 2nd, in geological position.

1st. *Similarity of organic remains.*—In the bituminous shales of the Mahadevas we have the following Bengal fossil plants: *Tryzygia speciosa*, *Vertebraria indica*, and a species of *Phyllothea*, a fragment of which is figured by Dr. McClelland as *Poacites minor*. Geol. Surv. Tab. XVI. f. 4. In the carbonaceous shales of Umret, besides the *Phyllothea* now alluded to, another stem, but unfurrowed, which seems to resemble McClelland's *Poacites muricata*. Tab. XIV. f. 6. In the laminated sandstone of Kampti, in addition to *Vertebraria* and the two *Poacites* as above, *Teniopteris*, perhaps of the same species as at Rajmahal, and McClelland's *Pecopteris affinis*, Tab. XII. f. 11. b., which in our specimen, is seen to be a well marked species with a tripinnate frond.

In all these localities, the genus *Glossopteris* abounds, but it is so difficult to represent in a figure its minutely anastomosing venation, that nothing but a comparison of specimens side by side would warrant the identification of species. However, there is little fear of any of the Bengal ones failing to find a match among some of ours, as from the sandstone and coal shale, we must have about twelve species in all, many of them very perfect and in the height of fructification. While we seem to have outstripped North Eastern India in *Cyclopteris* and several other vegetable remains, we are decidedly behind in regard to the Cycadeæ. The only specimen, which I have procured is a small fragment from the sandstone of Kampti, the leaflets of which are narrower than the minutest blade of grass, that I have ever seen.

2nd. *Similarity of geological position.*—It may be supposed that, though there is a general agreement in fossils between the coal strata of Bengal and oolitic rocks here, yet their position may be slightly different. However, from all the descriptions of Bengal coal strata, to which I have had access, I have noticed that

## GOLD.

where the sandstone is present to afford materials for comparison, the tendency to bituminous and carbonaceous shales there, as here, occurs immediately under the great mass of arenaceous beds. In proof of this I need only refer to the sections given by Mr. Homfrey from Beng. As. Soc. Journ. Vol. XI. p. 748, Palamow and Singra, and to the observations made by Mr. Osborne on the supposed coal-field at Umlah ghat near Bidjeegurh. Ibid, Vol. VII. p. 843.

In conclusion I would add, that though amongst the Cutch oolitic strata some are evidently marine, yet from what I have seen of those in the Deccan or read of those in Bengal, I know of none of them in either of these districts that exhibit the least evidence of having been deposited in the sea or ocean: all seem to be of fresh-water origin.

(814) *GIRARDINIA LESCHENHAULTIANA*, the Neilgherry nettle, is frequent all over the higher range of the Neilgheries: the bark yields a fine, strong, white flax-like fibre, which the hill people obtain by plunging the plant in hot water, to deprive it of its virulently stinging properties, and then peeling the stalks. The textile material so prepared is of great strength, and the Todawars use it as thread.

(815) *GMEIINA ARBORA*. *CUMBULA*, *RHEED*.

Gumbhara, SANS. and BENG. | Gumar Goombar, HIND. Joogani Chukar, TEL.

(816) *GLYCYRRHIZA GLABRA*. Lin.

### The Root.

Liquorice Root. | Yastimadhuca, SANS.  
Addimoduram, TAM. | Ussulussoos, ARAB.  
Meettie luckerie, DUK. | Beykhmechuck, PERS.  
Jethimadh, HIND. | *Ains. Mat. Med. p. 24.*

(817) *GOGA*. The name of a tree very generally found in most of the Philippines (*Encernada Philippensis*), the woody filaments of which yield a soapy matter much used in washing linen, and in the process of gold washing for the purpose of precipitating the metal from the sand. It is a shore or littoral plant, formerly ranked by botanists as an *Acacia*.—*Crawford's Dis. of the In. Islands, p. 144.*

(818) *GOLD* is found to occur in lumps in the alluvium of a mountain in Sarawak named Trian. Several of the lumps weighed from three to four bunkals, and they were rarely less than one are two amass in weight. Gold is found in Nanning, near the hill, Buket Jalatang.

In 1848 the total amount of gold in use in the world was estimated by the best authorities at about £600,000,000 sterling and the annual supply was believed to be between eight millions and nine millions sterling. From the recent extraordinary influx consequent on the opening of the gold fields of California and Australia we may compute the amount now (1858) in hand at

## GRANITE.

about £820,000,000 sterling. The data in the estimate are as follow:

From a table in Westgarth's Victoria, it appears that those two regions have produced,

California.	Australia.
1849 ... 2,000,000	None
1850 ... 9,000,000	None
1851 ... 13,000,000	1,000,000
1852 ... 15,000,000	14,000,000
1853 ... 20,000,000	20,000,000
or California an addition of..	£659,000,000
Australia do.....	35,000,000
All other sources in the five years..	40,000,000
To those add the present product of £50,000,000 per annum from all quarters for two years.....	100,000,000

£834,000,000

From this deduct for waste estimated at £2,000,000 per annum

for seven years ..... 14,000,000

£820,000,000

This net product now in the world is equivalent to about 205,000,000 ounces troy or 8542 tons. Great as the amount seems it could be all contained in a cubic block of gold only 23 feet in diameter. The gold coinage in Great Britain, France and the United States amounted in 1843 to £4,200,000 and in 1853, it was £41,800,000 or nearly ten-fold as large.—*H. D. R. page. 189.*

(819) *GOOMADEE*,

Goomadee, TEL. | Tagoomooda, TAM.

A large timber tree, a native of the mountainous parts of India.

The wood is used for a variety of economical purposes: that of such trees as will square into logs from eighteen to twenty-four inches resembles teak, the colour is almost exactly the same, the grain rather closer, at the same time it is as light or lighter and as easily worked. It is used for the decks of pinnaces about Chittagong, Dacca, &c, and is found to stand the weather without shrinking or warping better than any other wood known there.—*Rohde, M. S. S.*

(820) *GOOJUR*. A race in the villages in Northern India addicted to plunder.

(821) *GRANITE*. Many of the temples of Southern India are constructed of this stone. Its preservation, and the sharpness of its carvings, testify to its great durability and the absence of wear and decay makes it difficult to determine from appearances, the age of many oriental buildings made of this substance.

The best granite quarries are at Bangalore, Sadras, Cuddapah, Vizagapatam, and Bellary; and the different modes of quarrying by the action of fire, by wedges, or by gunpowder, and explained in "Captain Foord's valuable little practical treatise on building and road making."

The prices vary in different localities, according to the cost of labour and the hardness of



## GUANO.

the stone. There is a variety of greenstone resembling the whinstone of Scotland which is much used for building and ornamental purposes in Madras; it occurs in many parts of Southern India and is known under the names of freestone and grey granite. It is hard and durable but more expensive than the granites, from the greater labor of quarrying and cutting the blocks; at Madras the cost of this stone is as follows:

Tank stones, from 3 to 600 lbs. Rs. 1-4-0 per ton.

In addition to the general use of this material for building and religious sculptures, the natives occasionally make domestic articles of it, such as round millstones, pestles and mortars, door-posts, lintels, &c. Ornamental granites of bright colors occur in several localities, those of Salem, Chittoor and Seringapatam are flesh colored, red, green, yellow and grey. Those of Arcot and Goodoowanchair are pure white. The Bellary and Bangalore sienites, are red, grey, and white, with the colors blended in about equal proportions.

The two last may perhaps be considered the most durable in India, some of the pale-grey granites and pegmatites or binary granites of Southern India contain a large proportion of felspar which leads to their decay. The carvings at Conjeveram, Trichacoonum, Sadras and Chellumbrum, have lost a good deal of their sharpness from this cause, while those at Tarpur-tree, Wootimitta, Hera Toombal, and other places in the Ceded Districts are nearly as sharp as when first executed. In a few temples and Mahomedan tombs, the most richly cut pillars and ornaments are hewn out of basalt, augite, or basaltic hornblende. The best specimens of this kind of carving are at Vellore, Seerah, Timevelly, Humpee, Adony, Dummul, and Anagherry. The carvings have often a polished surface resembling black marble, but they are so hard as to strike fire with steel.—*M. E. J. R.*

(822) GRASSES. The pig, the cow, the horse, the sheep, and the goat, are the most useful creatures to men. They are wanted everywhere where men live, and there are seventy-two kinds of food which the pig will eat.

Two hundred and sixty-two, the horse.

Two hundred and eighty-seven, the sheep.

Four hundred and forty-nine, the goat.

(823) GUANO. Birds forming Guano, M. A. Ramonde, Professor of Natural History at Lima, was sent in 1853 by the Peruvian government to the Chincha Islands, in order to ascertain the quantity of guano existing in these Islands; during a sojourn of more than six weeks, he made observations on the origin of the guano deposit and on the birds to which it owes its existence. In some places the guano deposit is 30 metres in depth. From the bodies of animals as well as from various manufactured articles found in it, he

## GUINEA GRASS.

concludes that the deposit belongs to the present epoch of the earth's history. The birds observed during his visit were *Pelecanus majus*, Molin: *Carbo Gaimardii*, Lesson: *C. albigula*, Brandt: *Sula variegata*, Tschudi: *Spheniscus Humboldtii*, Meyen: *Plotus anhing*, Lin: *Rhyncops nigra*, Lem. *Larus modestus*, Tschudi: *Puffinaria Gannotii*, Lesson: *Sterna inca*, Lesson. These species do not all live constantly on the islands, some of them only appear at the breeding seasons. The pelicans do not appear to produce much guano as they almost always inhabit the cliffs and their excrement falls into the ocean. The same may be said of the species of *Carbo*. The species of *Sula* contribute more to the deposit, their number being greater and their habitations being more in the interior of the islands. The species of *Plotus* and *Rhyncops* are very rare, those of *Larus* are more numerous, the *Sternas* only visit the islands to lay their eggs, but their numbers are so very great that they must contribute in a great measure to the formation of guano. The *Spheniscus* abounds in the southern island which is inhabited. These birds not being able to fly hollow out habitations for themselves in the guano. The birds which produce largest quantity of guano are the *Puffinarias*: their number is incalculable. *L. Institut*, May 1856—*Ed. New. Phil. Jour. Nov.* 1856, page 178.

(824) GUIWARA,

Guhwara, HIND.

A swinging cradle.

(825) GUILANDINA BONDUCELLA.  
NAT. ORD. CESALPINEÆ.

Bonduc nut, ENG. | Kutkaringa, ENG.

The nut is a common febrifuge in Bengal and other parts of India.—*Indian Annals*, No. 6.

(826) GUINEA GRASS, *Panicum Jumentorum* Spry's Suggest, p. 15. This grass has been cultivated to a considerable extent in India and Ceylon with more or less success according to the care and attention bestowed on it. When well manured and kept clear of weeds it grows more luxuriantly and admits of being cut every six weeks or two months. A small patch, near Colombo, which, beginning with above three quarters of an acre has gradually been extended to above an acre and a half, has now for seven or eight years, supplied 3 or 4 milch cows, and from 5 to 7 horses continually with all the grass required for their consumption and has latterly left a surplus which has been dried for bedding and hay. When first planted it frequently attains a height of even 9 feet and a stalk taken promiscuously from a small patch planted lately in Combaconum measured 10 feet  $4\frac{1}{2}$  in length, but when cut two or three times it grows thicker but not so high. It is exceedingly excellent feeding for horses and cattle, and is generally preferred by them to the ordinary country grass, though

## HEDYSARUM TUBEROSUM.

horses which are hard worked seem to prefer the dry grass roots supplied by the grass cutters. It should not be given to cattle fresh but the supply for one day should be cut the day previous, and it should not be cut too close to the ground, but the stalk ought to be left 7 to 9 inches high. It is a good plan to move the ground between the roots every time the grass is cut, and the ground should be heavily manured after every three or four cuttings. It is very hardy and may be easily propagated. It requires abundant moisture but will not live in a soil which is at all marshy. It answers best planted in small tufts 1 ft. 9 in. to 2 ft. apart, which rapidly spread into stools from 6 inch to 1 foot in diameter.—*Literis, M.S.S.*

(827) GURRAS. The Gurras is a Nepaul tree that affects the highest situations; its flowers are large and of a deep red; and yield by decoction a purplish colour, which are converted by acids into a tolerable pink.—*Smith's Nepaul*

(828) GURU OR GOOROO. Govind Sing was the last of the Padshahs. The ten Padshahs or Gurus were 1, Nanak; 2, Angad; 3, Amara-das; 4, Ramadas; 5, Arjun; 6, Hargovind; 7, Harkishan; 8, Teghbahadur; 9, Harah; 10, Govind Sing.

## II.

(831) HALHED, Nathaniel Brassy Halhed, in 1776 published a code of Gentoo laws or ordinations of the Pundits, from a Persian translation made from the original, written in the Sanscrit language.

(832) HANG TUAH. The celebrated champion Hang Tuah called "the Laksamana," must not be confounded with the Laksamana of the Portuguese writers, as the latter lived several generations after the first who accompanied King Mansur Shah to Majapahit.

(833) HAOU ? TSING ! TSING ! The Chinese salutation on meeting, meaning literally, are you well ? hail ! hail !

## (834) HEDYSARUM ALHAJI.

Camelsthorn, ENG.	Showk ul byza, ARAB.
Fève de loup, FR.	Badawert, Shiturkar,
Kamels dorn, Sussklec,	* PERS.
GR.	Juwa (n) sa, IND and
Dehveh Samani, TUR.	CASHMIR.

## (835) HEDYSARUM TUBEROSUM.

*Kadsumi.* Bank's Icon Kempf. tab. 25.

Darce, Goomodee, TEL.

Shrubby, twining; *leaflets*, downy *Racemes* long; *flowers* three-fold. *Legume* hairy, pendulous, four jointed; contracted at the joints.

A rare species, a native of the valleys far up

## HEIGHTS AND DISTANCES.

(829) GYPS. As Mr. Yurrell does not appear to discriminate the Gyps occidentalis, it is just possible that the bird which he notices appertains to that particular race, rather than to the genuine Gyps Fulvus of the Himalaya.

(830) GYPSUM. Sulphate of Lime or Gypsum is obtained in a good many districts. The best qualities are from Ootatoor near Trichinopoly, the Chingleput District, Sadras, Ennore, the Red Hills, Nellore, Masulipatam and Bangalore. The only new localities for this mineral are Sadras, the Red Hills, and Nellore. It is now known to occur very abundantly in the Madras Presidency in two forms, the Fibrous and Crystalline Gypsums, both free from Carbonate of Lime, and well suited for the Manufacture of Plaster of Paris, for moulds, busts, statues or ornaments. It occurs chiefly in the green sand or lower cretaceous formations, and is almost invariably accompanied by Fossils. The Fibrous Gypsum of Bangalore, Tiagur and Nellore, are the thickest and best. It is not yet known in what strata these occur, as the accompanying Fossils have not yet been traced, and the natives seem averse to show the localities for this mineral in those districts, though rewards of 20 Rupees have been offered for this information.—*M. E. J. R.*

amongst the mountains. It flowers during the hot season, at which time it is perfectly naked of leaves, being deciduous about the beginning of the cold season.

The root peeled and bruised into a cataplasm is employed by the natives of the mountains where it grows to reduce swellings of the joints.—*Roxb. Fl. Ind. Vol. III. page 863.*

## (836) HEDYCHUM SPICATUM.

Kapoor HIND.	Suttee, HIND.
Kuchree, HIND.	Sidhuol, HIND.
Scer, HIND.	

The root sticks are pounded with tobacco and used in the hookah.

## (837) HEIGHTS AND DISTANCES.

*Table of heights and distances along the proposed line of Railway from Surat to Agra. Communicated by Sir R. Hamilton, Bart., Agent to the Governor General for Central India. Bombay, Baroda and Central India Railway.*

Distance from Bombay in miles.	Name of place.	Height in feet above low water at Broach.
	Surat	80
219	Broach	143
263	Dubai	145
334	Rajpore Ali	994



# HERODIAS.

Distance from Bom- bay in miles.	Name of place.	Height in feet above low water at Broach.
352	Joneanri Ghat	1,385
369	Para	1,325
387	Tirla Ghaut	1,850
419	Dhar	1,850
459	Indore	1,853
480	Ragoogurh	1,960
495	Gola	1,650
503	Tuppa bari Ghaut	1,788
507	Tuppa Ghaut	1,865
524	Ashta	1,620
548	Camp of Sehor	1,620
567	Bhopal	1,690
578	Balrampoor Ghaut	1,640
604	Bhilsa	1,406
636	Oodeypoor	1,326
698	Budwur (on road from Lul- lutpoor to Chandeyree)	1,250
715	Betwa river (near SeriesGhaut)	1,008
757	Jhansi	745
785	South bank of Sind River	640
806	Antree pass	960
817	Gwalior	650
849	Chumbul river, flood level of	458
884	Agra	565

April 4th 1856. Jour. Beng. As. Soc. No. 111 of 1856.

## (838) HELICTERES ISORA:

Maror Phullee (Joukaphul) Patsum.

The fibre of the bark makes good ropes.

(839) HERITIERA, (*The Ka-na-zoo, or Saul, or Soondree-tree*) is a much larger tree than in Bengal, chiefly found on the tide waters. Fruit hangs in loose bunches, size of grapes, very pleasant, one seed. Leaves large, alternate, smooth, green on the upper side, and silvery white beneath. Timber, hard, straight-grained, elastic, and durable; used for millwork, spokes, shafts, oars, &c. There are several species of this valuable tree.—*Malcom's Travels in South Eastern Asia*, V. 1. p 282.

(840) HERODIAS. Three specimens observed of an Egret in winter dress seemed to differ only from ordinary *Herodias garzetta* in having black toes.

# HOOGLY RIVER.

## (841) HIBISCUS SERIACUS.

Ooda Godhul.

There are four varieties of this plant: two purple, a single and a double; and two white, a single and a double. The flowers are used to blacken the eyebrows and shoe leather.

(842) *HIRUNDO FLAVICOLLA*, BLYTH, belongs to the group of Republican Swallows, (*Petrochelidon* of the Prince of Canino), and has similar habits to the *H. fulva* of N. America. Upper parts glossy black with white lateral edges to the dorsal feathers more or less seen: the rump brownish and crown dark rufous; lower parts white, with black mesial streaks to the feathers of the throat and breast; the under surface of wings pale brown; tail slightly furcate, with a slight whitish spot more or less developed, towards the top of the inner web of most of the feathers: tertiaries also white tipped. Length about  $4\frac{1}{2}$  inches: of which tail  $1\frac{1}{4}$  inch, wing  $3\frac{1}{2}$ .

This interesting new retort nest-building swallow, writes Mr. Jerdon, I discovered during a late trip, and found it only in two spots, building in company, the nests crowded together on rocks overlying the rivers Soane and Karne in Bundelcund, at which time it was breeding.

(843) HIT. A miserable town, the usual place where caravans cross the Euphrates between Baghdad and Damascus. There are copious fountains of bitumen and Naphtha outside the town with the smell of which the whole water and air is infected. It is undoubtedly the place mentioned by Herodotus, under the name of "Is," as furnishing bitumen for the building of Babylon.

(844) HLA PET, *Burmese*, literally Wet-Tea, in Burmah, to the eastward of Bamo and Kountung, hills are visible, peopled by cateran Kakhyens, and by breeches wearing Paloungs, peaceably growing tea for pickling. This is the Hlapet under notice, which is made up with oil, salt, assafoetida, &c., into a sort of pickle, and is essential to the comfort of every Burman, being partaken of on all ceremonial occasions. It is floated to Ava on bamboo rafts, so as to be retained always partially wet.

## (845) HOOGLY RIVER.

*The mean Silt held in suspension, is as follows:—*

	Water. oz.	Solid earthy matter silt.	Carbonate of lime in water.	Total solid (silt and lime.)
1842,... .. Mean, ... ..	25.33	6.04	7.95	13.99
1854-55 at 3 ft. depth, Mean, ... ..	23.70	6.02	1.32	7.34
•	49.03	12.06	9.27	21.3
Mean of both Series, ... ..	24.51	6.03	4.63	10.66

HOPLOPTERUS VENTRALIS.

HORSE. EQUUS.

	Water. oz.	Solid earthy matter silt.	Carbonate of lime.	Magnesia.	Sulphate of lime and iron.	Total of solid matter in wa- ter; silt & solution.
Calcutta, ... ..	24.51	6.03	4.63	0.00	0.00	10.66
Gasper Channel, ... ..	24.89	1.69	6.94	7.60	2.03	18.92

Observers, and place and time of observation.	Width of River	Mean depth.	Sectional area.	Mean velocity per second.	Discharge per second.
	Feet.	Feet.	Sq. feet.	Feet.	Cubic feet.
Lt.-Col. Goodwyn, B. E. at Calcutta, Clive Street Ghat to Howrah, in March. ...	2.060	36.0	74.160	4.5	444,960
A. Bedford, Esq., H. C. S. river Surveyor. At Moyapore, 13 miles below Calcutta, March, 1854. ... ..	3.300 (nearly)	29'20"2	„	2.88	507,060 (H. P.)
A. Bedford, Esq., at Jiggerkolly, Semaphore below Diamond Point and N. W. C. W. 2½ from Culpee Pagoda, in March 1854*.	8.800	32'1"4	„	4.596	1,277,009 (H. P.)
Averages of the Mississippi river as given in Mr Ellet's work. ... ..	8,300 (p. 30.)	115.0 (p. 33.)	200,000 (p. 34.)	Surface 7.00 (p. 36.)	979,240 below New Orleans, (p. 41.)

(846) HONG, A word used in original Malayan invocations in the same way as the Arabic Bismillah is used in the modern ones. Hong is deemed a very unhallowed word, of great power, and so panas, (hot), that if any man uses a Hong invocation three times, nothing that he undertakes for himself will succeed, and he will live powerful but miserable, able to afflict or assist others, but unable to assist himself. It appears to be considered as a recognition of an essence or first principle beyond God and an appeal to it for power which God has not granted to man. It is used in Japanese invocations and a Javanese explains it to mean Embryo of Being, Primeval Essence; so that Sir T. Raffles' conjecture, that it is the Hindoo Om (Aum), is probably correct.—No. 5, Jour. Ind. Arch.

(847) HONEY. The honey of the Archipelago is a thin syrup, very inferior in flavour to that of temperate climates. It is chiefly sought on account of the wax, which forms a large article of exportation to Europe, India, and China.—Crawford's Des. Dic. of the Indian Islands, p. 152.

(848) HOPLOPTERUS VENTRALIS. Chœ-

tusia gregaria was mistaken in Mr. Jerdon's Catalogue of the birds of the peninsula of India for Hoplopterus ventralis.

(849) HORSE. EQUUS. Two Tibetan animals are enumerated as wild "*Equus Kiang*, Moorcroft; *E. hemione*" (quære *hemionus*?), "Auct? Found generally throughout Tibet.

"40. *Asinus equioides*, Bligh. Species want verification, spoken of by Moorcroft and others: called wild Ass by the Tibetans, and said to be common on the plains of Tibet. Mr. Hodson, gives a name to the latter animal, which Mr. Bligh is satisfied refers to *E. hemionus*, or the *Kiang* (vide XV, 146.)

The 28th No. of the *Calcutta Journal of Natural History* contains a paper by Mr. Hodson, entitled 'Description of the wild Ass and Wolf of Tibet,' in which he states—"There is, I believe, no species of wild Horse in Tibet, and only one species of wild Ass, viz., the Kiang:" and Moorcroft named this animal *Equus Kiang*, and Mr. Hodson had himself termed it *Asinus equioides*, but Mr. H. gave as a third name *Asinus polyodon*.

\* And below the point where the Damooda and Roopnarain join the Hooghly. The flood tide from the sea much augments the volume of water here so that the discharge shewn is that of the whole tidal water of the estuary rather than that of the river.



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(850) HOT SPRING. There is a hot spring near Chirana Puteh, and another at Salanama in Rambau. Tin has been procured near Taba, and also near Chirana Puteh.

Dr. Watson, Jessore, submitted a memorandum on two hot springs in the village of Kujoorah.

Dr. Palmer, the Civil Surgeon of Jessore, reported on these Kujoorah Springs in December 1854, to the magistrate of the district.

(851) INAW-BEN, Burmese, is a large tree, of pale-yellow wood, preferred for making combs. It bears a large, fragrant fruit, but worthless.—*Crawford*, v. 1. p. 192.

(852) HUMULUS LUPULUS. The Hop, has been extensively distributed in the Himalayas. At 2,500, in the Deyrah Dhoon, it grows well: and at an altitude of 6,000 feet, in the Government gardens Missouri, but, in those regions, the best limit appears to be 4,000 or 4,500. A small sample grown in the Kangra valley was pronounced equal to the finest Kent hops.

(853) HUSSEIN, SHEIKH OF THE ALOUINS. —This individual was well known to all travellers who journeyed to Petra and Jerusalem by the way of Akaba, and generally to their cost. Taking advantage of their position, when they must either give up seeing Petra or accede to his exorbitant demands, he succeeded frequently in extorting a far larger sum than under ordinary circumstances would be paid for the hire of

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camels. He was sly, wily and cunning, possessed of great skill in arranging a bargain, but no warrior; with his own tribe he bore the reputation of being a coward, though very clever with his tongue.

(854) HUSSUN AND HUSSEIN, sons of Ali and his wife Fatimah, the daughter of Mahomed, who were destroyed, the former by poison, and the latter slain by a party of Yezed's soldiery. Hussun was buried at Medina. They are regarded as martyrs, and during the Mohur-rum, "*Marsees*" or funeral odes are recited in their names, with pathos such as few can listen to without deep emotion.

### (855) HYDRILLA VERTICILLATA.

Kurelee, Hind.

This plant is used by the sugar refiners of Saharunpore for covering the surface of sugar, in order to allow the slow percolation of water when refining it.

(856) HYDROPHYLAX MARITIMA, Linn. Seaside *Hydrophylax*. A straggling herbaceous plant, native of the shores of Coromandel, where it shows its pale lilac blossoms great part of the year. The branches run over the sand, sometimes under the surface, and strike root at the joints. It answers well as a sand binding plant where the sand is moist.

(857) HYDROSAURUS SALVATOR, a reptile of India.

## I.

(858) IBI-GAMIN, a glacier in Eastern Thibet, in height 22,260 feet English = 20,886 French feet.

(859) INDIA. Among the plants of foreign growth introduced into India since its possession by the British, may be mentioned, the Tea plant, succeeding admirably in Assam, and the Himalayas, Coffee, Cinnamon, Nutmeg, Bread-Fruit, Mahogany, Log-wood, Alligator Pear, Cherimoyer, Litchee, Loquat, Arrowroot, Ammabolo; and among valuable vegetables, the potato, carrot, and turnip, and some English fruit trees. To these might be added a list of ornamental trees and shrubs, besides several indigenous plants, the cultivation of which has been greatly improved and increased.—*Indi. Anna. Medi. Scien.* p. 259.

(860) INDIAN ARCHIPELAGO. We will here give some information additional to that under the word Archipelago.

The term "Indian Archipelago" by which that group of islands is now generally known, cannot supply a concise and appropriate name for the native inhabitants. The Greek Archipelago is inhabited by Greeks, and they are

called so, but it would be very inappropriate to call a native of the Indian Archipelago Indians. It therefore becomes necessary to make use of the term "aboriginal tribes of the Indian Archipelago" or some equally long and inapplicable name, when speaking of the Malaya-Polynesians of the Archipelago, which from the constant repetition required in Ethnological discussion becomes almost offensive, so that a writer on this subject often experiences great difficulty in rendering his compositions even readable.

The French, who are distinguished by the extent of their writings on Ethnology, have adopted the terms Oceanie or Oceania and Malasia to designate the Indian Archipelago, neither of which, however, have been by any means generally adopted. The late Dr. Prichard, the distinguished author of the "Physical History of Mankind," uses the term Malasian when speaking of the brown-complexioned races of the Indian Archipelago, being the only English writer who appears to have noticed them. The reason is sufficiently obvious. The term "Oceania" is equally applicable to several other clusters of islands, and both that and "Malasia" are not

sufficiently suggestive to impress themselves on the memory of the general reader. Sir Stamford Raffles proposed that the brown complexioned races should be termed "Hither Polynesians" to distinguish them from the allied tribes of the Pacific who were to be termed "Further Polynesians;" but the Saxon adjunct seems to have met with no favour with ethnologists, for no other has adopted them.

Nevertheless the time has arrived when a distinctive name for the brown races of the Indian Archipelago is urgently required, and it should be made to accord as closely as possible with the terms by which that portion of the world is most generally known, namely "Indian Archipelago" or "Malayan Archipelago." By adopting the Greek word for "islands" as a terminal, for which we have a precedent in the term "Polynesia," the inhabitants of the "Indian Archipelago" or "Malayan Archipelago" would become respectively Indu-nesians or Malayu-nesians. One writer has chosen the latter for several reasons. The first term would be too general, and might be thought equally applicable to the Ceylonese and to the natives of the Maldives and Laccadives. The latter, on the other hand, will show on the face of it that it is intended to apply only to the brown races of the Archipelago, and it would be some acknowledgment of the enterprise of the Malaysians in having extended their voyages over the entire Archipelago previous to the arrival of Europeans. Their language, too, is spoken at every sea-port, with the exception of those of the Northern Philippines. —*Journal of the Indian Archipelago, February 1850, page 71.*

On the authority of Newbold, the population of the Malay Peninsula numbers as follows in several states.

Kedah contains, ... ..	50,000 inhabitants.
Pera, ... ..	35,000
Salangor, ... ..	12,000
Johore, ... ..	25,000 (a) Far too
Pahang, ... ..	40,000 high; and
Kemaman, ... ..	1,000 this we sus-
Trangganu, ... ..	30,000 pect is the
Kalantan, ... ..	50,000 case with
Patani (b) about, ... ..	30,000 many of the
Sungei Ujong, ... ..	3,200 inhabitants.
Rambau, ... ..	9,000
Johol, ... ..	2,000
Muar, ... ..	2,400
Orang Binua Johole, ... ..	1,000
*Orang Binua of the rest	} 25,000
of the Peninsula (c) ..	
Pinang and Province Wel-	} 120,000
lesly. <sup>1</sup> ... ..	
Malacca, <sup>1</sup> ... ..	46,882
Singapore, ... ..	60,000
Total.....	542,482

With regard to Patani, however we may men-

tion that previously to the Siamese invasion it contained 54,000 inhabitants, Newbold, vol. II. p. 70. I allow therefore 24,000 persons to have been slaughtered, or reduced to slavery on that occasion.

Judging solely from the number of the Orang Binua in Johole, the number there given is a very small computation, but although the length of the Peninsula is about 400 miles, by an average breadth of 120 miles, and we are aware generally that the interior of this vast space is inhabited by the various tribes of the Orang Binua and Samang, yet in the present state of our knowledge, it is better to state the population moderately as above.

Thus in the Straits Settlements, and the Malay Peninsula, we have a population moderately computed at something above half a million souls.—*Page 380.*

A close approximation of the Netherlands official documents, and the numbers given by Monsieur Temminck in vol. II p. 2, with the general account given by English writers, may convince us that the total amount of the population of Sumatra is about 4,550,000, and we may without further delay proceed to ascertain the number of inhabitants residing at the various islands in the vicinity as follows:—

Pulo Nias, <sup>1</sup> ... ..	250,000
Batoe group <sup>2</sup> ... ..	3,270
Poggy, Engano, &c. <sup>3</sup> ... ..	10,000
Linga, Bintang, Dryon, Singkip, Karimon,	
&c., &c. <sup>4</sup> ... ..	100,000
Banka <sup>5</sup> ... ..	40,000
Billiton... ..	7,000
Anambas group ... ..	3,500
Aor, Tingi, &c., &c. ... ..	1,000

Islands ... ..	Total...414,770
Sumatra... ..	4,550,000
Total of Sumatra and adjacent islands	4,964,770

—*Page 383.*

It will be easier to compute the third division of our task, which includes the island of Java with the small islands round it, besides Bali, Lombok, Sumbawa, &c.

The population of these islands may with a great degree of certainty be set down as follows:

Java and the small islands around.....	9,560,380 in 1845.
Increase in three years and a half.....*	500,300
Bah.....	900,000
Lombok.....	259,000
Sumbawa.....	200,000
Floris.....	278,000
Soler, Adenara, Lombatte, &c. &c. &c.,...	157,000
Sumba or Sandalwood island.....	425,000
Timort.....	669,000
Total of third division.....	12,909,680
Malayan Peninsula, &c.....	562,482
Sumatra &c.....	4,964,770
Total of three divisions.....	18,436,622

—*Jour. of the Indian Archipelago, Vol. III. No. IV. June 1849, page 384.*



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St. Stamford Raffles states that of Palo Nias, at 230,000, but we have taken the authority of Mr. Oppe, who makes it from 250,000 to 300,000.

Temminck is the authority for that of the Bato group.

In the *Moniteur des Indes*, M. Temminck does not extend the population of the Poggy and Engano group as there are as yet no official returns on the subject.

On the authority of Temminck that of the Linga &c. group is given at 88,000 in 1840, but the islands being at peace, and no longer much exposed to the incursions of pirates we have allowed an increase of 12,000 in 9 years.

Temminck gives 85,000; increase allowed only 5,000 in 9 years, on account of climate and the description of labour.

This of Java in census of 1845 as given in the *Moniteur des Indes*, vol. II. p. 21 [see Dr. Bleeker's estimate and remarks vol. I of this journal p.p. 75, 76.—Ed.] This increase is calculated from *Moniteur des Indes* vol. II. p. 28. 1847 was given in this journal (vol. II p. 172) at 64,995. We did not recollect this in time to correct the text,—Ed.

Temminck vol. I. p. 340 gives the number in Bali at 800,000. Mons Van Den Breck in 1818, reckoned the population of this island at 987,500, which is reduced in the *Moniteur des Indes* to 738,000, by reckoning 4 persons to one fighting man, which is evidently a very low estimate. Allowing for a small increase, we have taken for Bali the medium of these authorities.

*Moniteur des Indes* Vol. II., p. 238, is the authority for the populations of Lombok.

*Moniteur des Indes*, Vol. I., p. 70, is the authority for that of Sumbawa if the table from which this number is extracted is certainly not exaggerated.

The languages of the islands facing the Malay Peninsula from Pegu to Sumatra, are Indonesian and not Ultra-Indian.

The languages spoken may be arranged in four groups, Peninsular, Sumatran, Javan, and Bornean.

*Achean*. This territory is so named by Europeans, from its principal port Ache. The Acheeny language is distinguished from all others in Asia by having the accent on the terminal instead of the penultimate syllable. In other respects its phonology has the prevailing Sumatran character.

*Andamani*, a language spoken in the Andaman islands. It is more purely Indonesian, being dissyllabic. In phonology, the Andamani is fundamentally opposed to Silongi, Nicobari and Simangi; Nias to Achean, and Tilanjani to the rude Malayan dialects which appear to have prevailed, and are partially preserved in the adjacent portion of Sumatra. The vocalic element is found in all the Sumatran and Peninsular languages; strong in Battan and Lampongi; less so

## INDIAN ARCHIPELAGO.

in the Malayan dialects, and comparatively weak in the Achean and Samangi. In the Andamani Telinjani and Nias, the consonantal element is very slight.

*Bali*, a language spoken in the Javan Archipelago.

*Battan*. In the Battan dialects of Sumatra, an Indonesian element predominates, and they have the closest affinity with Malay. The basis of Battan is similar to that of Nias, the latter language having spread into Sumatra, and modified the W. Indonesian character of Battan.

*Besisi*, a dialect of the Malayan peninsula.

*Binua*. The ruder Binua dialects of the Malayan Peninsula, when compared with Malay, present the same aspect as the uncultivated Sumatran. But having been, comparatively with the more civilized and powerful Battan and Achin races, almost completely subjected to Malayan influence, the indigenous peninsular vocabularies are rapidly disappearing. The languages of the *Binua* or *Sakai* of *Peru*, appears to resemble the ruder dialects of the Barman group, which is the next to the southward.

*Bornean languages*. Of these we may name the *Ngaju Kahayan* of the South coast, and that of the *Landaki* of the West coast, inland of Pontianak. Both are entirely Malay in their structure and formatives.

*Bugis*, a language spoken by the people of this name.

*Javan*. The Javan language participates to a certain extent in the peculiarities of the *Kawi*, and *e* is a frequent sound in both. Indeed, it would appear that most of the peculiarities of the Javan, or those phonetic traits which distinguish it from the general N. Indonesian phonology on the one side, and from E. Indonesian on the other, may be referred to the influence of *Kawi*. The other western languages of the Java group,—Sundan, Maduran, (with its dialect Bawean), and Bali, have phonologies in most respects similar to Javan, but preserving still more of the primitive W. Indonesian character. The Javan of the inhabitants of the Tenggu mountains is much more guttural than that of the polished Javans. Those of Sassak and Sanbawan are softer than Javan. Javan and Malayan have deeply influenced the languages of the trans-Javan chain. The principal distinction of the Javan group, is in the possession of a sacred or poetical and a deferential dialect, and the Hindu origin of the former. Remnants of deferential or sacred words are found in most of the languages of the Archipelago, as of the Malay, of Sumatra, and the peninsula, the Ngaju of Borneo, and the Wugi of Celebes. Their antiquity in Asia, is vouched for by Polynesian. Wherever Hinduism was established, it has left traces of a sacred or sacerdotal language. The phonology of the Javan group closely resembles that of the ruder Sumatran Peninsula.

and is chiefly distinguished from it by being more hollow, palatal, aspirate and distinct, and less nasal, guttural and smothered, while equally slow and broad. Sundan, however, amongst other striking affinities with the southern Sumatra-Peninsular Malay, has a decided nasal vowel. Javan is richer in formations than Malay, and it exhibits more freedom and power in their application. It participates to a certain extent in this peculiar consonantalism of the Kawi.

The other western languages of the Javan group, Sundan, Maduran (with its dialect Bawiru) and Bali, have phonologies in most respects similar to Javan, but preserving still more of the primitive N. Indonesian character. Those of Sassab and Sambawan are softer than Javan.

*Kayan.* This northern language must be considered as the most southerly of the N. E. projection of Borneo, a position which brings it into proximity with the Bissayan and E. Indonesian languages. This is assuming the correctness of Mr. Burn's statement that the Kayans have spread from the basin of the Tiding over the water shed into the north-western lands extending from the Bruni to the Rejang.

*Kawi.* The Kawi language preserves some evidence that, at the era of its formation, the Javan language was less removed from the adjacent languages than it afterwards became through the continued development and influence of Kawi, and a disposition to a factitious and pedantic culture.

*Lampongi,* a language spoken by the Lampongs.

*Landak,* a language spoken in the Archipelago.

*Maduran.* A language of the Archipelago, spoken in Madura.

*Malay.* The Malay language may have been preceded in Sumatra by languages more Philippine in their ideologies, and may have derived much from them, but it belongs fundamentally to a far lower development. The Malayan language, in its more ancient form, partook in a considerable measure, of the general character of the W. Indonesian of Sumatra, as is evident from the phonology of its ruder dialects. With the purer phonology of E. Indonesian, it combined the consonantal, aspirate, and guttural tendencies of the Malacca basin. Traces of this earlier character are still found in the centre of Malayan civilization, Menangkabau, where the language received its greatest culture, and attained the form, which, with some phonetic improvements and a few glossarial changes, it has preserved in its dissemination throughout the Archipelago. The Malay of Menangkabau is distinguished from all the other Sumatran languages, by its higher culture, purer phonology, wider prevalence and greater influence on other languages. It is superior to the ruder phonologies of the Peninsula and Sumatra, but also, to a large extent, Javan.

*Mantawai.* The language of a race who inhabit the Pera and Pagai groups. Its phonology, is considerably more Battan than that of Nias, purer than the ruder Malay, and apparently free from Sumatran aspirates.

*Ngjan,* a language of Borneo.

*Nias,* a language spoken in the Archipelago.

*Nicobari,* a language spoken in the Nicobar group.

The Nicobar language has a phonology, allied to that of the Silong and Samaug.

*Silongi,* a dissyllabic language spoken in the Mergui Archipelago.

*Simang.* The most northern of the old Indonesian languages of the Malay Peninsula, are those of the Simang tribes of Kidah and Pera. They are mainly dissyllabic, like other Asianic ones, but they have more monosyllables, and a dissyllabic tendency may still be detected in the contraction of some Malay words. The phonology of the Simang has some strong peculiarities, the voices low and soft compared with that of the Binua and Malay tribes.

*Sumatran.* The principal languages of Sumatra are the Battan dialects and the Malaya, these being spoken by the largest populations and over the widest extent of territory. In Sumatra we found at least three well marked languages, each occupying its own area, and a fourth still preserving its peculiar character and location, although much affected by foreign influence. In addition, the Western Islands contain at least three other distinct and stable languages. It has however only the diffusive language the Malay.

*Sundan* has some peculiarities which separate it from the other languages of the Javan group, and ally it to some of the W. Borneon and S. Peninsular dialects. Formatively Sundan is more simple than the Javan or even the Malayan, and approximates to the ruder Peninsular, Sumatran and Borneon languages.

*Tilanjani,* a language spoken in the Archipelago.

The use of letters has been immemorially known to all the more civilized nations of the Indian Archipelago, of the brown complexioned, lank haired race; and many alphabets, at once distinct from each other, and not borrowed from any foreign source, are to be found among them, from Sumatra to the west, to Celebes and the Philippines to the east.

The Javanese is certainly the most perfect alphabet of the Archipelago, and a brief account of it will give a general notion of the rest which, although they differ in form bear it, in principle, a common resemblance. It has a distinct, and invariable character for every sound in the language, and so far, therefore, it is a perfect system. The consonants amount to 19 and we represent them in roman letters, as follow: b. c. d. d. g. j. k. l. m. n. n. p. r. s. t. t. w. y. Besides



these there is the aspirate which always follows a vowel, and never aspirates a consonant. The vowels are 6 viz., a. a. e. i. o. u. The diphthongs are 2, viz ai. and au., but have no characters, being expressed only by their elements.

The Javanese alphabet, like all the others of the Archipelago, is written from left to right.

In the character thus described are written, the proper Javanese, the Sunda, the Bali, and occasionally I believe the Lombock. The Sunda, and Bali alphabets, however, want the palatals d. and t. Altogether, including Palembang in Sumatra, it is probable that the Javanese alphabet is current among no less a population than twelve millions.

In Sumatra, beginning from the west, the first evidence we have of a native written character is found among the Bataks, and it is singular enough that a nation of cannibals should possess the knowledge of letters.

The substantive characters of the Batak alphabet are the same as those of the Javanese, with the exception of the letter c and the palatals d and t which it wants.

The next alphabet we meet with, proceeding eastward, is the Korinchi, found in the country of the same name which borders on Menangkabau; the parent country of the Malay nation.

We come next to the Rejang, the alphabet of Lemba and Pasumah on the western side of Sumatra. This consists of 23 substantive characters.

The Lampong nation, which occupies that portion of the south-western side of Sumatra which lies opposite to Java, divided from it only by the Straits of Sunda, has its own peculiar alphabet, which consists of 19 substantive letters, the vowel a and the aspirate being included among them. The consonants correspond in power, exactly with the Javanese, the palatals d and t excepted, which the Lampong does not contain.

The Lampong, like the Rejang, has the Hindu classification, but it is not so correctly followed, the vowel a and the sibilant, are found out of place, and thrust in among the liquids.

After quitting Sumatra and Java proceeding eastward, the first example of a native alphabet we meet with occurs in Sumbawa, which is ascribed to the nation called Bina. This character is no longer in use, but has been long obsolete, having been superseded by the current alphabet of Celebes.

Celebes appears to have produced two distinct alphabets, the one at present in use over the whole island, and which has extended to Banton and Sumbawa, or wherever else indeed the Bugis nation has settled or colonized.

The modern Bugis alphabet consists of 23 substantive characters. All this shows that the Bugis alphabet is imperfect, and for fulness and precision not comparable to the Javanese. In form, the body of the Bugis character con-

sists for the most part of small segments of circles running horizontally, the letters being distinguished from each other, by small processes.

In fact, the main characteristic of the Malayan letters, their differing among themselves, and their differing equally from all foreign letters, leads to the inevitable conclusion, that each alphabet was a separate and independent invention, made, in all likelihood, in the localities in which we at present find them — *Page 775.*

What causes conduced to this early invention of letters among Malayan nations and at so many different and distant points, it is not very easy to say.

The nine alphabets of the Archipelago are the produce of five large islands only, out of the innumerable ones which compose it. The most fertile and civilized island, Java, has produced the most perfect alphabet, and that which has acquired the widest diffusion. The entire great group of the Philippines has produced, and that in its greatest and most fertile island only, a single alphabet; even this one is less perfect than the alphabets of the western nations, in proportion as the Philippine islanders, who first seen by Europeans, were in a lower state of civilization than the nations of the west of the Archipelago.

The Malayan Peninsula and Borneo, extensive as they are, have never given rise to an indigenous civilization, sufficient to raise their inhabitants beyond the condition of small and miserable communities, and hence no indigenous alphabet can be traced to them. Their more civilized inhabitants are invariably stranger emigrants. This must be owing to the absence of a certain kind of fertility, in the land available to the rude and feeble efforts of a native industry, such as elsewhere gave rise to a concentrated population, to leisure and to letters.

No kind of native writing can be traced to the Spice Islands which, notwithstanding their rich native productions, are incapable of yielding corn, iron, or cattle, the rough staples of early civilization, and without the presence of which, letters have never been invented or existed. In the great island of New Guinea, with its savage negro population, and with the same deficiencies, the presence of any kind of writing is not reasonably to be looked for.

No trace of a written character has been found in the wide extent of the Islands of the Pacific. Most of them are, probably, too small to have furnished a population, at once sufficiently numerous and concentrated, to generate the amount of civilization requisite for the purpose. In the great islands of New Zealand, with their comparatively energetic race of inhabitants, the discovery of letters would, most probably, have been made, as among some rude nations of Sumatra, had the civilization necessary not been precluded by the absence, as in the smaller islands, of the

larger animals for labour, and of all the cereal grasses for food.

The facility with which materials to write on are obtained in the countries occupied by the Malayan nations has, probably, contributed something towards the early discovery of the art of writing. The want of them, on the contrary, is known to have proved a great obstacle to the progress of letters, and probably was to their invention in temperate regions. The absence of a good material in ancient Europe hindered the invention of printing, and its presence in China, no doubt contributed largely to its early discovery in that country.

The Indian islanders write on palm leaves, which have received no other preparation than that of being dried, and cut in slips,—on the inner bark of trees, a little polished only by rubbing,—on slips of the bamboo cane, simply freed from its epidermis, and on stone, metal, and finally on paper.

The palm leaf employed is that of the lontar, or *borassus flabelliformis*. The Malay word is most likely a corruption of two words, *ron*, a leaf in Javanese, and *tal*, the proper name of this palm in Sanskrit. This seems corroborated by the Javanese name, which is written *rontal*. From the use of this word, it might, at first sight, be imagined that the practice of writing on palm leaves was derived from the Hindus. But it happens that this word, with many others wholly or partly Sanskrit, belongs to the ceremonial and factitious dialect of the Javanese language a genuine native name *kropyate*, existing for it, in the ordinary one, so that no safe conclusion can be drawn from this etymology.

The instrument for writing with on the palm leaf, bark, and the bamboo is an iron style, and their writing is, in fact, a rude engraving, which is rendered legible by rubbing powdered charcoal over the surface which falls into the grooves and is swept off the smooth surface.

The Javanese alone understand the manufacture of a kind of paper. This is evidently a native art, and not borrowed from strangers, as is plain from the material, the process, and the name. The plant, in the Javanese language, is called *gluga*, *Broussonetia papyrifera*, and the article itself *daluan* changed into *dalanian* for the polite language. The process is not the ingenious one of China, India, Persia and Europe, but greatly resembles that of making the Egyptian papyrus, and still more closely the preparation of the South-sea cloth, the raw material being, indeed, exactly the same. The true bark, cut in slips, is long macerated and beaten, and after being thus treated, slips of it are joined to each other over a smooth surface, and defects made good by patching. The fabric thus obtained is of a brownish grey colour, unequal in its texture, rigid, but strong.

With the exception of the Javanese, it does

not seem that the natives of the Archipelago ever wrote with ink, before they were instructed by the Arabs, no doubt from the absence of paper. The Javanese have a native name for "pen" and "ink," *sua* and *mansu*, but with the other nations, the only ones are Arabic, *kalam* and *dawat*, often indeed greatly disfigured, as in the example of the Bugis who convert them into *kalah* and *dawak*. The pen generally used is not reed as on the continent of Asia or a quill as in Europe, but a stub obtained from the *Aren palm*, *Saguernus saccharifera*.

Even paper is generally known to the Indian islanders by the Arabian name of *kartas*, so that it is probable that a true paper was imported long before the arrival of Europeans, although the natives were never taught the art of preparing it. At present European paper is in general use by all the more civilized nations, to the exclusion of Asiatic.—*Crawford on the Indian Archipelago, in Journal of the Indian Archipelago, Vol. II., No. XII., Decr. 1848, page 776-7-8.*

#### *Trading Ports of the Indian Archipelago.*

*Albay*, (Philippines.) The capital of a district of the same name, situated at the S. E. extremity of Luzon. The town, which contains many substantial buildings and about 13,000 inhabitants, lies two miles inland from the head of the Gulf of Albay, which is said to afford excellent anchorage, but is not well known, as the trade is carried on exclusively by pontoons and other coasting vessels, which carry the produce to Manila. Its position, near the St. Bernardino channel, which is much frequented by vessels from the Pacific bound to Manila, is important, but Sorsogon, an excellent harbour in the same district, presents so many superior advantages as a port of refuge for vessels that have met with accidents in the Pacific, and also as a trading port, that it will be preferred when the outports of the Philippines become the resort of European traders, an event which seems likely soon to take place. Albay is chiefly remarkable for producing Abaca or Manila hemp of better quality and in greater abundance than any other district in the Philippines. This production is obtained from the filaments of the *Musa textilis*, a sort of banana, which is easily propagated by transplanting the suckers that spring up about the roots of the old plants. The Abaca is generally planted in the cacao gardens, to shelter the shrubs from the heat of the sun, and it seems to be only in Albay, Leyte, and on the north coast of Mindanao that it is cultivated expressly as an article of commerce; the production of sugar absorbing the attention of planters in districts more adjacent to the capital. The filaments are detached from the stem by a very simple process, which closely resembles the mode of preparing hemp in Europe. The consumption of Manila hemp is daily increasing, more especially in the United States of America. As



it evidently requires a rich volcanic soil, it would probably succeed in the Moluccas and in the islands east of Java.

*Amboyna*, *Ambon* of the Malays and Dutch, the capital of the Netherlands possessions in the Moluccas, Lat. 3°41'41" S. Long. 128°9'51" E. Dumont d'Urville. The town and fort are situated on the S. E. side of a narrow inlet, 14 miles in depth, which penetrates the island in a N. E. direction and nearly divides it, the low isthmus which joins the two peninsulas being only a mile and a half across. The Bay of Amboyna, as this inlet is called, consists of an outer bay, on the shores of which the town is erected, and an inner bay or harbour, with low swampy shores, which admits and affords shelter to vessels of the largest size, but is very rarely resorted to, even by ships in want of repairs, owing to its extreme unhealthiness. The outer bay is unfathomable except in a few spots close to the shore. The anchorage is on a bank of coral and sand, which extends rather more than a quarter of a mile from the beach in front of the town, and is so steep that at a cable's length from the shore the depth is 25 fathoms. The best anchorage for a vessel having much cargo to discharge is about half a cable's length from the end of the government jetty, to which she can haul for the purpose of discharging, but this cannot be done without permission of the authorities, which is rarely withheld, however, unless there happen to be several ships of war in port, and it becomes necessary to keep the jetty clear for general purposes. The best anchorage for vessels coming for refreshments only, or whose stay is not likely to be long, lies to the N. E. of the jetty, and it will be necessary, especially during the S. E. monsoon, to carry a warp on shore to one of the anchors that are set up near the beach, to prevent the ship from being driven off the bank by the puffs of wind from the land. The bay is clear of hidden dangers, but when the weather is calm, the strength and eccentricity of the tides and eddies often cause alarm to strangers. The danger however is more apparent than real, as the currents never set home on the land. A ship entering the bay during the S. E. monsoon should pass pretty close round Nusa-Niva Point, and keep the starboard shore on board all the way up to the town; and if coming from the westward she should never attempt to enter the bay until she can lay up for this point and so be able to proceed along the weather shore. There is a bank with 15 to 25 fathoms upon it a few cables length to the S. of Nusa-Niva Point, which might prove useful to a ship driven out of the bay by the outset, an event which often takes place during the calms which prevail in the intervals of the westerly monsoon. The bottom is coral, so that only a kedge or stream anchor

should be used, as there might be difficulty in getting it again.

*Ley-timor*, the smaller peninsula on which the town is situated, is 15 miles long by 4 wide, and is traversed throughout its entire length by a range of hills, which rises abruptly from the sea on the S. E. side, but leaves several small plains on the shores of the bay, the largest of which is the site of the town of Amboyna. Kitu, the north-western peninsula, is entirely composed of hills, some of which attain considerable elevation, but scarcely sufficient to entitle them to the name of mountains. The nucleus of the town consists in Fort Victoria, which owes its origin to the Portuguese, but it has been much enlarged and improved by the Dutch. It contains the chief government office, the barracks for the troops, and the military store houses. The esplanade of the fort is surrounded by a number of large brick houses without an upper story, which, with those that line two streets running towards the Governor's house, at Batu Gadja, are occupied by the principal residents. The Campong China, which abuts on the S. side of the esplanade, is the commercial portion of the town, and is almost exclusively occupied by Chinese and other native merchants. It also contains the principal church, and a spacious market house, which is the greatest curiosity in Amboyna, not on account of its architecture, for that is of the most primitive oriental character, but from its being chiefly occupied during market hours, by the Orang Nigri, or people of the villages of the interior, who resort to it for the purpose of disposing of their surplus produce. To the north-east of the esplanade lies the "Burgher" quarter, which is occupied almost exclusively by the descendants of the old Portuguese and Dutch inhabitants, retired soldiers and their families, in fact by all those who in the persons of themselves or of their ancestors have been connected with Europeans. This quarter also contains a spacious church, in which the service of the Dutch Reformed religion is performed in the Malayan language.

*Population.* The island of Amboyna contains about 30,000 inhabitants, a fourth of whom occupy the capital and suburbs. The country people, who are called Orang Nigri, or villagers are the ancient inhabitants of the country. They are generally below the middle size, have neat and active figures, and that bright and intelligent look which is also characteristic of the Dyaks and of the people of the interior of Celebes, but is rarely met with among the Malayas or Javanese. The extreme neatness of their dress, which consists, generally of a sarong and kaboya of black calico, their great personal cleanliness, and their utter rejection of the use of siri or betlenut, which so disfigures the mouths and teeth of the Javanese and Malays, combines in producing a tout ensemble which excites no small degree

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of surprise in European strangers from the western parts of the Archipelago, who probably learn for the first time how prepossessing a people the natives may become through education and cleanliness. Their ancient form of religion has almost entirely disappeared, its place being supplied by that of the Dutch Reformed Church. The villages are still, as formerly, under the local controul of the Orang Kaya or hereditary chiefs, who are assisted by several Orang Tua, or elders, and two or three Marino, or police officers. The Orang Kaya have also the local management of the clove plantations, and are responsible for the trees attached to their respective villages being kept in order, and for the entire annual supply of spice being sent in to government. Every village is provided with a native school-master or Guru, who has been educated at the institution of the Nederlandsch Zendeling Genootschap or Dutch Missionary Society, which has long been established at Amboyna. These school-masters teach reading and writing in the Malayan language, (the Roman character being employed) with the rudiments of arithmetic and geography, and as the entire juvenile male population with the greater portion of the female, attend the school, education is more generally diffused than in any country of Europe, with the exception, perhaps, of Holland and Scotland. The immense numbers of Malayan Bibles and other religious books that have been circulated, not only in Amboyna, but throughout the Moluccas, have produced an uniformity of idiom which greatly facilitates communication not only between Europeans and natives, but between the natives of the different islands themselves. Indeed the Malayan language here assumes a degree of importance which is unknown to the other European establishments in the Archipelago. It becomes in a great degree the language of general society, as Dutch is rarely spoken except by individuals born in Europe who are few in number. A constant correspondence is also kept up in Malayan between the Government and Orang Kaya of the interior. Under these favourable circumstances the Malayan dialect of the Moluccas affords a facility in expressing ideas which is unknown to the westward, where the language is only spoken generally by uneducated people, a circumstance which may eventually lead to the Amboyna dialect becoming the general medium of communication throughout the Archipelago. The Guru undertakes the duties of curates or lecturers, in addition to their own, performing divine service in the village churches, which, if far from the capital, are only occasionally visited by the European clergy; indeed the latter, owing to the smallness of their number, are called upon to perform the duties of bishops rather than of pastors. The villagers lead a very quiet life, subsisting chiefly on the produce of their lands,—sago, maize,

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yams and the sugar of the tuak palm,—which is eked out with fish obtained chiefly by means of stone weirs erected on the coral reefs that line the coasts. Crime is almost unknown, indeed is rare even in the capital, where from the motley nature of the population, which includes many slaves from Macassar, Java, and Bali, it might be expected to prevail to some extent.

The natives of Amboyna have been characterised by strangers as excessively indolent and apathetic, which indeed might be looked for under the circumstances in which they are placed, but the accusation is most unjust. It is true that the Burghers who usually crowd the jetty, spending their time in angling for small fish, will refuse to carry even a light burthen; but it must be remembered that this branch of manual labour is the peculiar province of slaves, and it is not to be expected that the Vrij Burghers, poor enough as they usually are, but priding themselves in professing the same religion with the Europeans, would lower themselves by performing a description of labour which even Chinese and free Mahomedans would disdain. As to the natives of the interior, what with the labour of tending the clove trees, which must be performed, coupled with that of cultivating the soil, on which their very subsistence depends, they have very little idle time on their hands.

**Commercial History.** Amboyna had been resorted to by native traders from the west during many years previous to the first arrival of Europeans in the Archipelago, for the purpose of obtaining spices and other valuable articles produced on the island or collected from the neighbouring countries. In the year 1512, the Portuguese viceroy Albuquerque, after the conquest of Malacca, despatched two commanders Abreu and Serrano, to explore the Moluccas. They loaded cargoes of cloves at Guli-guli, a port on the south coast of Ceram, but on the return voyage of, the Seano, which had separated from her consort, was wrecked on Nuša Pinho, or Turtle Islands, to the south of Amboyna. Serrano and his crew, after undergoing many hardships, succeeded in making their escape from the island in a coracora or native prahu, which they got possession of by stratagem, the crew having landed for the purpose of plundering the shipwrecked people. In a few days Serrano reached Amboyna, where he was well received by the inhabitants, and it was probably owing to this accidental circumstance that Amboyna was selected as a trading station by the Portuguese, in preference to the neighbouring districts of Ceram, which produced spices in much greater abundance. In 1605, the Dutch under Vas der Hagen attacked Amboyna, when the Portuguese garrison surrendered and was allowed to depart in two prizes, one of which sailed to Manifa and the other to Solor. In 1611 the English, who had traded occasionally with the Moluccas,



established themselves at Luwu, a port on the peninsula of Huamowel, which forms the eastern extremity of Ceram, but they were soon expelled by the Dutch. In 1620, owing to remonstrances made in Europe, the English were allowed to establish a factory at Amboyna, but it existed only two years, when it was effectually annihilated by the celebrated massacre of 1622, to which individuals of both nations, even now, feel it painful to refer. Amboyna did not attain a very high degree of importance until the year 1652, when a treaty was entered into with the king of Ternate, in which he consented to the extermination of the spice trees throughout his dominions. The Dutch were now enabled to confine the culture of cloves to the island of Amboyna, and one or two others in the neighbourhood, and that of nutmegs to the Banda group, a system which is maintained until the present day. Hongi-togten, or expeditions for eradicating the spice trees of the neighbouring countries, were undertaken periodically by the Dutch governors assisted by the native princes in their interest, but this part of the system has now been discontinued. The English, on gaining possession of the Moluccas during the late war, maintained the system of monopoly and the Dutch government, since the restoration of the Moluccas, have very closely followed the footsteps of their old East India Company, but not with the same profitable results.

**Productions.** Amboyna is remarkable for the variety and importance of its vegetable productions. The island possesses a rich volcanic soil, and from the peculiarity of its position, it is accessible to the rains both of the Indian and Pacific Oceans, and as these prevail at different seasons of the year, the atmosphere is in an almost constant state of humidity, which proves highly favourable to vegetation. Its geographical position is also favourable with regard to variety of productions, for being situated in the close vicinity of New Guinea and Australia, it possesses the vegetation belonging to the Australian as well as to the Continental Indian system. The fruits, which all belong to the latter, are excellent in quality. They comprise the orange, lemon, shaddock, mangosteen, durian, mango, jambo, lansat, anona, guava, papaya, and tamarind. The bread fruit, (both the Manila and South Sea-island varieties,) is also found here. To these may be added the Kanari, a nut which furnishes a large quantity of oil, and which takes a conspicuous place in the domestic economy of the inhabitants. In its wild state, the nut although eaten abundantly by the inhabitants, is not very palatable to Europeans from the quantity of oil it contains, but the cultivated variety of the Kanari produces a fruit which is equal in flavour and delicacy to the almond, and is justly prized by all who have had opportunities of testing it. This tree belongs decidedly to the Aus-

tralian system, as it is not met with to the westward of Amboyna or perhaps, Buru, although it is common on the north coast of Australia, and, I believe, extends as far to the south as Moreton Bay, on the east coast. The Kanari-nut constitutes the principal food of the birds of Paradise, of Arru and New Guinea, during certain seasons of the year, and their intentness on seeking their food among the thick foliage of the trees affords opportunity to the hunters, who have previously concealed themselves among the branches, to shoot them with blunt arrows, when they fall to the ground and are secured by parties lying in wait below, and their bodies and feathers dried for exportation.

Of the numerous varieties of palm, the most useful are the sago, which usually grows in the swamps, and furnishes no small portion of the food of the inhabitants; the cocoanut, which is planted around every house; the sagoweer, nipa, and lontar, which furnish the tuak or toddy, a favourite drink of the natives, and the surplus of which is distilled by a simple process into an ardent spirit, or is boiled down into sugar. Lastly the pinang and nibong, the first of which furnishes the betel-nut of commerce, and the other supplies the inhabitants with a hard wood which is used for spears, bows, and digging-sticks or wooden spades for cultivating the earth. The stems of the sago palms when stripped of the leaves are used for fencing in the plantations, and are then called Gabba-gabba; while the leaves of the others are employed in making hats, mats, boxes, and baskets, of many varieties.

The aromatics, comprising the clove, nutmeg, kolit lawang, and kayu puteh or cajeput trees, all belong to the Australian system of vegetation, but it seems to have required the rich soil and moist climate of the Moluccas to bring the three first to perfection as articles of commerce. The kayu puteh, however which delights in the sandy soil of the sea shores, is found in greater perfection in Australia than in the Moluccas.

As the nutmeg and clove are both cultivated at Singapore, the former with great success, it will be unnecessary here to enter into minute particulars regarding the mode of cultivation, which, indeed, would be foreign to the expressed object of this memoir. The nutmeg of Amboyna is inferior to that of Singapore. It is only at the Banda Islands, which are especially devoted to the cultivation, that the nutmeg attains perfection, but there the clove tree yields a very different product, while at Amboyna it attains its highest state of development. As the climate of the two groups is precisely similar, this difference must be the result of a variety in the nature of the soil, in fact it soon becomes evident to those who have had opportunities of visiting both groups, that Banda and Amboyna

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are by no means alike in this particular. It struck me that the soil of Banda was chiefly enriched by the ashes cast out from the Gunning Api, or volcano, which stands nearly in the centre of the group, while that of Amboyna seemed to owe its fertility to the presence of decomposed limestone. The climate of Singapore exactly corresponds with that of Amboyna and Banda; the soil, only, is different, but this the skill and perseverance of our nutmeg planters have counteracted by producing a soil, through the aid of manure, which closely corresponds with that of Banda. The want of success that has hitherto attended the planting of cloves may probably be owing to a similar system of manuring being adopted to that used in the nutmeg plantations, whereas a totally distinct system is evidently required to produce the clove-soil of Amboyna. Perhaps, it would be well to obtain a sample of this soil from Amboyna itself, when analysis would shew what ingredients were required to render the soil of Singapore similar to that of the former place. When this is effected, the cultivation of the clove in the Straits will, in all probability, be perfectly successful.

The animal kingdom presents the same mixture of Asiatic and Australian varieties which has been noticed as characterising the vegetable kingdom;—the Australian opossum co-existing with the porcupine and civet cat of the continent of Asia. A small variety of the kangaroo, which still exists on the Arru Islands, is said to have been found here also formerly, but it has now disappeared. The opossum is the only marsupial which seems to hold its ground in the presence of animals of the old world. It is found throughout Australia, New Guinea, and the Moluccas, and has become more numerous in the settled districts of New South Wales than when the continent was first settled. This is probably owing to their taking up their abode in the forest trees, whence they also derive their food, so that they are not liable to the attacks of beasts of prey. The monkey, the only animal of the old world likely to molest them, does not exist in a wild state at Amboyna, although it extends along the Sumatran and Trans-Javan chain as far as the east end of Timor. Deer abound in the forests, but these are known, to have been imported originally from Java and Macassar. The domestic quadrupeds, consisting of a few ponies, cattle, buffaloes, goats and hogs, have all been derived from the same sources, indeed the process of importation, as far as regards the two former, is still going on, the island not affording sufficient open pasturage for breeding purposes. Fish are abundant throughout the Moluccas, and the varieties are very numerous. Valentyn, who evidently turned great attention to this branch of natural history, delineates upwards of 500 varieties in the plates attached to his famous work on the Moluccas.

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Agriculture has not made the slightest progress since the first arrival of Europeans. The plough is still unknown, or at all events, not used, the mode of turning up the ground by means of two sharp sticks, one held in each hand, being still generally practiced. The agricultural productions consist of maize, small-grained millet and pulse, with yams, sweet potatoes, melons and pumpkins. The sago palm can scarcely be said to be cultivated, as the young trees spring up spontaneously from the roots of those that have been cut down, so that the proprietor of a piece of sago ground has nothing to do but to thin the young trees, so as to afford room for those intended as standards to spread their branches. Rice, in sufficient quantities for the supply of the Government establishment and of those of the inhabitants who can afford to purchase it, is imported from Java. The cultivation is said to have been introduced, but in that case it must be confined within very narrow limits. The Count C. S. W. De Hogendorp, in his valuable "*Coup d'Œil sur l'Isle de Java*," (p. 321) states that the circumstance of the cultivation of rice never having become extended is attributed by some to the policy of the old Dutch E. I. Company, which threw every obstacle in the way of its cultivation, with the view of keeping the natives in greater subjection from their being only able to obtain supplies through the medium of the Company; while others attribute it to the indolence and inactivity of the natives. A third cause exists in the country people being obliged to reside on the uplands, for the purpose of attending to the clove plantations; they therefore live remote from the low country which alone is adapted for rice planting. Indeed they could not have formed rice-saws, without first destroying the sago palms with which the low lands are covered, an act which would have been exceedingly unwise under the circumstances of the case, as the sago could be collected at any season of the year, in fact, whenever the clove plantations did not require their attendance; while the rice cultivation would entail continued labour during long periods and they had no guarantee that the produce would not be appropriated by their rulers, as the spices were already. The natives of Amboyna, if left to themselves, would probably never have become a rice growing people, but their rich products would have enabled them to purchase abundance from the inhabitants of the western islands. This would have given rise to a commerce which has never existed under the grasping monopoly of Europeans, although it was maintained to a great extent previous to their arrival in the East. Probably the greatest evil that the natives of the Moluccas have derived from contact with civilized nations, consists in their having been deprived, for more than three centuries, of the nutritious food that is necessary to the full development of human powers.



The cacao, or chocolate-bean has lately been introduced, and grows luxuriantly on several spots in the neighbourhood of the capital. The like success has attended coffee and indigo, indeed Amboyna seems to be well suited to any tropical production that requires a rich soil and a moist climate.

Commerce. The Nederlandsch. Handel Maatschappij, or Netherlands Trading Company, has an establishment here, which, with the Government, engrosses almost the entire foreign commerce. Amboyna, although the capital of the Moluccas, does not possess a single merchant ship; but some of the Chinese and other natives have a few trading prahus which are chiefly employed in bringing provisions from the neighbouring coasts of Ceram and Buru. The annual supplies of rice and other stores for the Government, and of goods for the Maatschappij establishment, are brought from Java during the westerly monsoon in ships belonging to Arab or other native merchants settled in Java, and these return in May, June, and July, with the yearly produce of cloves, and such articles as the Maatschappij agent may have collected. The latter, however, receives payment for his piece-goods and other European manufactures chiefly in silver guilders or rupees, which are circulated to a considerable extent here owing to the government officers, the troops, and the crews of ships of war on the station, being paid their salaries or wages upon the spot. The annual supply of cloves, averages about 300,000 pounds. The receipts on account of this spice amounted in the year 1822, to upwards of 500,000 guilders, while the expenses of the cultivation, or rather, of the small rewards given to the Orang Kaya, Orang Tua, and Maruinos, who superintended the plantations, amounted to 90,000 guilders. During this year the supply was rather less than usual, but it is never, even with the duties and taxes levied at the port, sufficient to pay the expenses of the establishment, which amount to the sum of nearly 1,000,000 guilders annually. Vessels belonging to other European nations than their own are not allowed to trade at Amboyna, and even private vessels of the Dutch very rarely visit the port unless taken up for government service. These restrictions are sometimes evaded by small Spanish vessels from the Philippines which bring cargoes of Manila segars and China goods, and take cacas and cash in return. This subject was discussed at some length in the Singapore newspapers about 12 months ago, as it was thought that from the provisions of our treaty with the Netherlands of 1824 it would afford an opening for British vessels also. The 7th Article of this treaty runs thus: "The Molucca Islands and especially Amboyna, Banda, Ternate and their immediate dependencies are excepted from the operation of the 1st, 2nd, 3rd and 4th Articles until the Netherlands Govern-

ment shall think fit to abandon the monopoly of spices: but if the said government shall at any time previous to such abandonment of the monopoly allow the subjects of any power other than a native Asiatic power to carry on any commercial intercourse with the said islands the subjects of his Britannic majesty shall be admitted to such intercourse upon a footing precisely similar."

More importance was given to this concession (if it may be so called) on the part of the Dutch, in thus admitting Spanish vessels to participate in the commerce of the Moluccas, than it really deserved, for if the British government had deemed the opening of the ports of the Moluccas as conducive to our commercial interests it might have been effected years ago, and without any reference to the provisions of the treaty. I find that I have stated the fact of Spanish vessels being admitted to trade at the port of Amboyna in a report which was sent home to government soon after my visit to Amboyna in 1841, and which was published in the Parliamentary papers relating to port Essington in 1843. As I understand the fact has been denied by parties in Holland, I insert an extract from a recent work on the Philippines by M. Mallat, which was published in Paris in 1846, and as he cannot be supposed to have been aware of the full bearing of his paragraph, he may be considered, at least, as a disinterested authority.

"The departure of the vessels for the Moluccas takes place during the months of December and January. The merchandise they carry is of a similar description to that exported to Sulu, to which may be added fancy articles, and gown pieces for the ladies of the residents and the superior authorities. Their return cargoes consist of cacao, birds of paradise, cloves, nutmegs, &c. These islands are Dutch possessions; commerce can therefore be carried on there in the greatest security. But the import duties being very considerable, a great deal of contraband trade is carried on. The freight is 5 per cent. on the value of the merchandize, and  $\frac{3}{4}$  per cent. additional per month."—*Les Philippines: Histoire, Géographie, Mœurs, Agriculture, Industrie, et Commerce des Colonies Espagnoles dans L'Océanie par J. Mallat. Paris 1846, vol. II. page 326.*

These vessels, however, take the precaution of touching at the island of Sulu, and obtaining a native flag and papers. The local authorities seem to be pretty well aware of the evasion, but they are heartily ashamed of the illiberality of their Government, and are evidently not inclined to make very minute inquiries when the parties do not attempt to break the regulations of the port. English and American vessels in distress occasionally put in at Amboyna, where they are treated with hospitality, and allowed to purchase such stores and refreshments as the place affords.

but a guard of soldiers is put on board the ship the moment she arrives, and remains there until the period of her departure, which proves so annoying that the port is never resorted to except in cases of the utmost necessity.

The following articles are to be obtained at Amboyna in addition to those already mentioned:—Ambergris, kayu puteh oil, bees-wax, ebony lingoa-wood, kayu-buka, and many other ornamental woods, some of which are prepared in slabs from 6 to 9 feet in diameter. When the resources of the neighbouring countries come to be developed, this list will be greatly increased, especially in the particular of resins and dye woods, of which the adjacent island of Ceram furnishes many varieties.

The present miserable state of commerce at Amboyna scarcely authorises so long a notice as the above, but it is not likely to remain a sealed port for ever, and when once opened, it must become the emporium of the Moluccas and New Guinea. Much as we may admire the moral courage of the Dutch in persisting to maintain a system that has been repudiated by every other civilized nation, it may be doubted whether their line of policy, which is so well calculated to invite aggression, will tend much to the stability of their Indian empire. As long as the system of monopoly had only to encounter the apathy of European nations, which naturally do not care much about the commerce of remote places concerning which they know little, affairs have progressed smoothly enough, but a new nation is springing up in the south, and gradually spreading over the continent of Australia, which is already beginning to shew symptoms of discontent at being excluded either actually by the absolute prohibition, as in the Moluccas, or virtually by exacting regulations, as in Java, from ports in their immediate neighbourhood, whence they could derive those supplies to tropical produce for which they are now obliged to resort to the more distant Spanish settlements of the Philippines. That there is a strong and intelligent party in Holland favourable to liberal measures is well known, and I cannot conclude this article more appropriately than by extracting the following remarks from the valuable work quoted above, the author of which has spent the greater portion of his life in the public service of the Dutch Indian settlements, and I believe, now fills the important office of vice president of the Council of Batavia.

It is a fact unfortunately too well known, and which it will answer no good purpose to pass over in silence, that the Company, to insure the monopoly of its own wares, caused all the clove and nutmeg trees, beyond the number necessary to produce the quantity of spices that they could sell, to be rooted up and destroyed, often with arms in their hands. To effect so general a devastation it became necessary to commit

many violences, to maintain costly garrisons, to build forts and strongholds, to pay pensions to the native chiefs, and in fine to deprive themselves of every other source of revenue.

“Again if the results of this system ensured them the exclusive trade in spices, still they were never able to sell more, in ordinary years, than two millions of guilders worth of cloves, nutmegs and mace, while to obtain them they often expended more than three millions, all in ruining these beautiful countries from which they might have derived immense advantages under a good administration.

“The cruel effects of this fatal system on the countries and nations that had the misfortune to be subject to its influence will be long felt, but let us hasten to say that a salutary balm has been shed upon the bleeding wounds, and we may now lay the first foundations on which an edifice may be erected more consonant with present times and existing manners.” The author here alludes to the results of the Governor General’s visit to the Moluccas in 1824, when the oppressive laws of the former Dutch East India Company, which were supposed to have led to the risings and massacres of Sapama and Nusa Laut in 1817-18 were greatly modified. These reforms, however, were not full enough to satisfy the natives, for in 1829 a conspiracy, in which many of the chiefs and a portion of the garrison were concerned, having for its object the massacre of the Europeans, was discovered, by accident when on the eve of consummation. Six of the ringleaders were shot, among whom was Raja Wangi, a chief of great influence with the natives. Lieut. Bastiaanse, who was an eye witness to the execution, states that Raja Wangi was not struck by a single ball at the first discharge, which tended to confirm a belief on the part of the natives that he was invulnerable.—*Voyages dans Les Molugues*. Paris, 1845. p. 103.

“No point in the colonial system has probably excited more attention on the part of the superior authorities in our Indian possessions than the problem as to the advantage or disadvantage of the monopoly of spices in the Moluccas; or has called forth more opposite opinions.

“The partisans of the olden time, and such are not wanting, pretend that without the monopoly of spices the Moluccas will not be of the slightest value to the state. The partisans of liberal ideas assert, on their part, that this exclusive monopoly carries a destructive germ that will in the long run cause the total loss of these valuable possessions. Nevertheless all parties agree that to carry out with success, and without imminent danger, changes in the existing system, it will be necessary to act slowly and with prudence, following a plan that will only present at first preparatory courses, and the effects of which will only make themselves felt in proportion to the results obtained.” Neau



moins tous etaient d'accord que, pour faire avec succes et sans un danger imminent des changemens dans le systeme existant, il fallait agir avec prudence et lentement, d'apres un plan que ne presenterait d'abord que des voies preparatoires, et dont les effets ne se feraient ressentir qu'au fur et a mesure des resultats obtenus. Coup d'œil sur l'isle de Java et les autres possessions Neerlandaises dans L' Archipel des Indes, par le Comte C. S. W. de Hogendorp, 1830, p.p. 315 et seq.

Similar opinions to those expressed by the intelligent author quoted above have been long entertained by the great bulk of the educated classes in Holland. Respecting the annual loss sustained by the government in supporting the monopoly there can be no doubt, and its oppressive bearing on the native population is sufficiently indicated by the annual decrease in their numbers. The Baron Melville Vancarnbee, in his valuable statistics of the population of the Moluccas (*Moniteur des Indes* for 1847-48) gives the following as the amount of population of Amboyna and its environs during the years 1837 to 1841 inclusive. 1837—11,702; 1838—10,909, 1839—9,041, 1840—9,274; 1841—8,966.

(861) *Amfuang* (Timor.) A small trading port about 40 miles to the north of Coepang, which is occasionally resorted to by prahus and small vessels for the purpose of obtaining sandal-wood and bees-wax, but for some years past the greater portion of the produce has been carried overland to Coepang, owing to the coasting trade having been much interrupted by Lanun pirates, who now visit the eastern islands of the Archipelago more frequently than formerly from their having been much disturbed lately on the coasts of Java, Borneo and Sumatra, by Dutch and English vessels of war. Amfuang was also frequently resorted to by British and American whaling vessels, chiefly to obtain spars for masts and booms, which are abundant and of good quality in the neighbourhood of the anchorage. In May, 1843, the English Whaler "Sarah Elizabeth," Captain Bellinghurst, while at Amfuang, with two officers and 14 men on shore cutting spars, was attacked by 5 large and several smaller Lanun prahus, the crews of which, after killing, taking or dispersing the party employed on shore, boarded the ship, the Captain and the remainder of the crew, who were taken by surprise, escaping to sea in the whale-boats. The pirates, after plundering the ship, burnt her to the water's edge, in which state she was found by three other whalers, that had been met with by Captain Bellinghurst in the offing, and had accompanied him for the purpose of rescuing his ship from the pirates. A full account of this transaction will be found in the "*Moniteur des Indes*" for 1847-48, p.p. 34-5. The article alluded to is the production of the late Jankpeer

Comets de Groot, who was during several years Resident of the neighbouring settlement of Rhio, and afterwards Secretary General to the Colonial department of Holland. For particulars respecting the productions, &c. see Coepang.

In many of the English charts, the next bay to the north of Coepang is called Amfuang Bay, but it is not known by that name to the natives, who apply it only to a spot a few miles to the N.E. of the Gunners Coin, in lat. 9° 3' 58" S. long. 123° 41' 24" Freycinet, and to an inland territory of which the latter is, or was, the sea-port.

(862) *Amhai or Amahoy* (Ceram.) A port on the south side of the island, nearly due north from Nusa Laut, the easternmost of the Amboyna group. The town lies on the shores of a small bay a short distance within Point Koba, which forms the eastern extreme of a large bight called Elipa-puteh. This place was formerly much frequented by native traders from the west, as the anchorage is said to be excellent, and easy of access, while the neighbouring territory once was remarkable for the abundance and quality of the clove produce. The trees, however, were destroyed when the power of the Dutch became paramount in these parts, and its trade has since consisted exclusively in a pretty constant intercourse, kept up by means of boats or cora-coras, with Amboyna, which place it supplies with large quantities, of provisions and pottery. The inhabitants are nearly Christians, and as the country around is populous and productive, it may at some future time become a trading port of consequence. The bay, although supposed to be clear of hidden danger, should be approached with caution, as the fringing reefs extend in some places more than a mile from the shore.

(863) *Amomang Bay* (Celebes.) A deep, narrow inlet on the north coast of Celebes, about 30 miles to the westward of Menado, the capital of the Dutch possessions in the northeast part of the island. This bay is much more secure than that of Menado, which is exposed to the heavy squalls from the northwest. Its north eastern shore should be avoided, as it is lined by an extensive coral reef. The best anchorage is in the southwest part of the bay, where vessels lie in 40 fathoms very near the shore, but sheltered from all winds. There is a small, but well constructed fort, in which the civil commandant resides, who is under the orders of the Resident of Menado. The chief production of Amomang is black coir or gummati rope, which is of excellent quality. A considerable quantity of coffee is grown in the neighbourhood, but this is all transported to Menado for shipment to Europe in the vessels of the Netherlands Trading Company. Amomang offers no inducement to the visits of trading vessels, but it abounds in refreshments, a circumstance of which the English and Ameri-

## INDIAN ARCHIPELAGO.

can whalers formerly availed themselves, but latterly certain restrictions have been placed on the intercourse between the inhabitants and foreign vessels, which will probably prevent its being resorted to in future. In February, last year, the American whaling ship *Octavia* anchored in Amomang Bay, but the commandant refused to allow the crew to purchase supplies until permission had been obtained from the Resident of Menado. In the course of two days the necessary permission arrived, accompanied by an order that the ship should depart from the Bay within twenty-four hours. It is said that the opening of Menado to foreign vessels, which occurred a short time ago, was accompanied by an order on the part of the Batavian government excluding them from all the coffee ports on the north coast of Celebes. Such a daring assumption of power is scarcely credible, but it seems, nevertheless, to be true.

(364) *Ampanam*, (Lombok,) a town on the west side of the island, in lat 8° 33' S. Horsburgh. It has of late years become the chief resort of foreign traders, owing to its being the nearest seaport town to Mataram, the present residence of the king of Lombok, which is distant inland about 3 miles. The anchorage is due west of the town in 10 to 15 fathoms sand, from 1 to 2 miles off shore, the latter distance being generally chosen from November to March, when the westerly monsoon sometimes blows with great strength, throwing a short but turbulent sea into the roads. During the easterly monsoon, ships taking in cargoes of rice often lie much closer to the shore, which is nearly steep to, it being necessary to use the utmost despatch in embarking their cargoes while the sea is smooth, for, although the wind is off the land during this season, a tremendous surf is often experienced for days together, which cuts off all communication with the shore except by signal, while its strength lasts. This surf is caused by heavy rollers from the S. W. which occur at intervals, and generally during calm weather. A similar phenomenon is experienced at the island of Ascension and sometimes at St. Helena. It is probably caused by submarine volcanic action, as it is evidently unconnected with atmospheric causes. In all the old charts a sort of ridge or bar, with 7 fathoms water upon it, is laid down, and is distinctly mentioned in Horsburgh's Directory as having existed in 1811, but this has certainly disappeared. A small knoll, having less than 3 fathoms upon it, lies to the south of the anchorage, about three miles off shore, which seems to be identical with the "shoalest part of the ledge" in the directions by Mr. Dawson, an officer of H. M. S. *Psyche*. (Horsburgh's Directory, vol. ii. p. 657, Edition of 1843. In October 1841, we anchored about a mile and a half to the N. E. of this knoll in H. M. S. *Britomart*, and immediately abreast of the town.

## INDIAN ARCHIPELAGO.

Ampanam was not frequented by European vessels previous to the year 1834; Labu-Hadji and Pijou, in the eastern side of the island, being then the chief resort of ships requiring cargoes of rice for the China market. About this period an English merchant, Mr. King, who had previously carried on business at Batavia, established himself at Ampanam under the protection of the King of Mataram, and was afterwards followed by Messrs. Bird and Lange, two Danish gentlemen connected with the China trade. The facilities their presence afforded for carrying on a commercial intercourse with the inhabitants, soon attracted British vessels that had taken out emigrants to Australia, and were on their way to the Indian ports to obtain return cargoes for Europe. These would often obtain a freight to China, the Mauritius, Singapore, and sometimes to England, or, if the captain was possessed of Treasury or other Bills could procure rice on the owner's account which would materially aid in paying the ships expenses if taken to China. During the year ending in October 1841 no less than 25 English ships loaded at Ampanam, either on owner's account, or on that of Mr King, who had now become the sole European merchant, Messrs. Bird and Lange, having removed to the neighbouring island of Bali, where the latter soon acquired great influence over the natives, and was of material assistance to the Dutch during their late invasion of Bali. In the meantime, Mr King, who had assisted the king of Mataram in an internal war which had made him master of the entire island, was appointed Bandar or controller of the trade of Ampanam, which virtually gave him the monopoly of trade as far as regarded Europeans. This prosperity, however, did not last many years, for a few months after our visit in the *Britomart*, a commissioner of the Dutch Government arrived from Batavia. The manuscript of his report, as well as that of Mr Moliere, an agent of the Handel Maatschappij, who visited Bali and Lombok in 1839, were used by Mr. Melville in the compilation of his valuable account of these islands, having been placed at his disposal by the ministry of the Colonies. (*Moniteur des Indes*, 1846-47.) Mr. King has since removed to Koti, on the coast of Borneo, and the British trade with Lombok may be said to have ceased entirely. Even the national flag of Lombok, which was often to be seen formerly in the roads of Singapore, has disappeared for some time past. It is scarcely known where the immense rice produce of the island now goes to, but it is said to be carried for the most part to Java in Dutch and native vessels, where it is much required to make up the deficiency caused by a large portion of the rice lands of Java being now devoted to the culture of produce better suited to the European market.

Ampanam also exports coffee, cotton, and to-



bacco. Refreshments of all kinds suited to the wants of shipping, -bullocks, pigs, poultry, yams, and sweet potatoes, -are to be obtained in great abundance; which causes the port to become a favourite resort for American Whalers during the season in which they fish in the seas contiguous to the N. W. Coast of Australia, namely May to September, when the boisterous season of the southern hemisphere obliges them to resort for a time to low latitudes. Labu Hadji, on the opposite coast of the island, has now, however, become the chief refreshment port of Lombok, the king having made a request that the whalers would confine their visits to the villages of the east coast, where refreshments were more abundant, and where the crews could enjoy themselves on shore without interfering with the trade. No less than 17 whalers have been seen in the port of Ampanan at one time, each with a crew of upwards of 30 men. Traders visiting Ampanan, or any of the ports East of Java, should take every precaution to prevent surprise, as the Lanun pirates now resort to these parts in greater numbers than formerly their course along the north-west coast of Borneo to the coasts of Sumatra and the Malay Peninsula being now obstructed by the settlement of Labuan, which they cannot pass without some intelligence being received of their motions, and this being conveyed speedily to Singapore, would inevitably lead to their being sought out and destroyed. In the year 1837 the schooner Maria Frederica, Captain Gregory, was cut off in Ampanan roads; and in 1840, the English whaler Mary, Captain Blossie, while at anchor at the North Islands, near the N. W. point of Lombok, was surprised and taken by a fleet of Lanun prahus; See "Moniteur des Indes" for 1847-48 p.p. 17 and 21; but the vessel and crew were soon afterwards ransomed for a large sum in Spanish dollars by Mr. King, who subsequently finding that the pirates still remained there, fitted out an English merchant brig, that was then loading rice for England, with guns and men supplied by the king of Lombok, and succeeded in driving them away for a time. There are no port dues, or charges, unless such may have been introduced recently.

For particulars concerning the population, productions, commerce, manufactures, &c., see Lombok. For the sake of arrangement I find it necessary sometimes thus to refer the reader to articles which have not yet appeared. Where an island or district contains several ports as is the case with Lombok, it would create needless repetition were I to give full particulars on the points mentioned in the text under the heading of each port. I have therefore classed all those minor ports which admit such arrangement into small geographical districts, such as "Sulu Archipelago," "Sumatra (West Coast)," "Timor" &c. a plan which may appear to leave the articles

unfinished, but will be found to facilitate reference when the publication is completed.—*Journal of the Indian Archipelago, Vol. IV., No. VII., July 1850, page from 380 to 410.*

(865) INDIGOFERA GLANDULOSA. Willd. III. 1227.

Barugadam, Tel. \*

A small shrubby species, a native of moist rich lands amongst the mountains. Flowers and ripens its seeds during the wet and cold seasons.

Of the seeds the natives of the hilly countries make meal, which they bake into bread, and use as an article of diet; when more agreeable food is scarce. Cattle are fond of the plant.—*Roxburgh's Flora Indica, vol. III, p. 378.*

(866) IND-WAY. Burmese. This large tree abounds in the Burmese forests. Seed the size of a small egg. It yields a very useful resinous gum, of a light-grey colour, used in the seams of boats, &c. It is obtained not only by incision, but drops on the ground, and is gathered without trouble. It is very much used, and may always be bought in the bazaar.—*Malcolm. v. 1, p. 192.*

(867) INDRO. See MACASSAR.

(868) IN-JEEN. Burmese. This is a large tree, common in the upper provinces. Flowers, small, pinkish yellow, very fragrant, growing in clusters, and celebrated in Burman poetry. This is said to be the species of wood generally found petrified near the earth-oil wells on the Irrawaddy. Gaudama died near one of these trees.—*Malcolm. v. 1, p. 192.*

(869) INK. The Tamools occasionally make ink with nearly the same materials, that we do; but that which is used by native writers in the Cutcheries and public offices is prepared by the following very different process.

First. A burnt rice water is to be made in this way. Half a seer of rice, burnt black, is to be well boiled in a seer and a half of water, till but one seer remains, then strain off the dregs. To this seer of burnt rice water, is to be added two pollams of *Kumburruk* (Lac) boil them well together and strain off the dregs.

Half a seer of *Carpoo veruum* (Lamp black) and half a pollam of *Vullam pisin* (Gum Arabic) are then to be well rubbed into a fine powder, and generally added to the decoction of *Kumburruk*, and burnt rice water; when the whole are to be rubbed together, and well shaken at different intervals, for the space of three days.

The Mahomedans prepare their ink which they call *seahie* in the following manner:

Take of Lamp black and Gum Arabic equal quantities, and pound them together into a very fine powder. This powder is then to be moistened with the juice of the pulp of the *Kuttalay*, (small aloe), and well rubbed at intervals, for two days together, after which it is to be formed into little cakes, that are to be put on plantain leaves, and dried in the sun for use.

(870) IPPU. The name of a tree in Borneo

## IRON.

from which is obtained the famous Borneon poison, with which the Idan tribe poison their darts. The poison is collected by this tribe only, and its effects are similar to those of the Llana and Ticinma of South America.—*Dalrymple's account of Sulu.*

(871) IRON. A considerable quantity is produced in the Salem district, and two varieties are obtained, one remarkable for its softness and malleability, the other for its steel-like hardness, which adapts it for the formation of edge-tools, cold chisels, &c.

The following are names given to this metal in process of adaptation to its finished manufacture. Culties or blooms of iron. Palms or bars of iron. Vuttoms or pieces of cast steel as it comes from the clay crucibles. Oolies or bars drawn out from the clay crucibles. Iron beads which ooze out from the blooms in the blast furnace.

Bloom iron from Paulghaut is readily malleable and furnishes a hard steel-like iron. The natives state that it is necessary to subject the bloom to a second fusion and much hammering before they can bring it to the state of the soft malleable iron, in which it is met with as an article of commerce.

This statement seems to correspond with what one might expect from the difference of appearance of two samples; the one of Paulghaut, being highly metallic as shown by its bright metallic lustre, while the black charry look of the other seems to indicate such an excess of oxids as to unfit it for the hammer.

At the Madras Exhibition of 1857, one of the richest departments of the Exhibition was the ores of iron and steel. "Almost every district in the Presidency contributes specimens, and the collections from some localities are very extensive and varied; those from Cuddapah, Hyderabad, Bellary and Coimbatore are particularly deserving of notice. Large collections were also sent by Capt. Puckle and Mr. Addis from Bangalore, but the quality of the ores is not rich at that station. The principal ores of the Cuddapah district are red, brown, and purple in colour, which yield iron of excellent quality and very malleable. Some of the magnetic iron ores of the same district are particularly rich in iron, and a few of them contain traces of manganese those from Chemoor and Poolevendalah, the latter is magnetic although earthy and dull red in the fracture and bright red in the streak. The steel grey and granular iron ores from Chitwail, Camalapoor, and Gooruncondah are all rich in the metal and more or less magnetic. The yellow ochre and rusty ores of the Muddenpully Talook are said to yield good malleable iron. The steel grey iron sand of Comarole and Yendapully in the Doopaud Talook are highly magnetic and contain a little manganese.

## IRON.

The micaceous iron ore and iron glance of the Doopaud Talook are also rich in the metal.

The most prevalent iron ores of the Hyderabad territories seem to be the rusty brown, red and yellow ochres; the iron or steel sands with manganese, and the specular or glance ores: now of the latter however are magnetic. The black, brown, and red cellular iron ores are abundant in this collection, and a great deal of attention appears to have been bestowed on the minerals of this District and on the iron ores in particular.

The Bellary District yields a variety of iron ores, some of which are very rich in the metal and several of them associate with manganese. The prevailing ores of iron, of this district are the black and grey ores alternating with sandstone liver colored ores (which has been repeatedly sent to Madras as copper ore) and red jaspery clay iron stones. They are also associated in the same district and in the vicinity of Kurnool and Gooty with Magnesian Limestone, Grits, conglomerates, Aluminous shale. Fire Clay and Black Dolomite, but the Fossils which are the surest indications have still to be sought for.

The Iron Ores sent by the Coimbatore Local Committee were of very fine quality, being particularly rich in the metal and the most highly magnetic in the Exhibition.

A Sub-Committee of the Jury carefully examined all the ores of Iron with the blow pipe, and as to their magnetic properties, and the following was the result of these examinations.

Magnetic Iron Glance of fine quality occurs in Coimbatore, Salem, Cuddapah and Vellore.

Magnetic Hæmatites in Cuddapah.

Magnetic Iron sand also in Cuddapah; none of the Iron sands of other districts magnetic.

Magnetic rusty Ochrey Iron Ore from Hyderabad was as the other Ores of Hyderabad magnetic or magnetic Iron Ores from Bellary, Masulipatam, Bangalore, Mysore, or other districts. Manganese detected in the Iron Ores of Hyderabad, Kurnool, Bellary, the Bababooden Hills, Mysore and Vizianagrum.

Meteoric Iron, exhibited from Mysore and Pondicherry.

Micaceous Iron Ores of good quality from Cuddapah and Vizianagrum. Brown hæmatite and Reddle from the Red Hills, Bellary and Hyderabad. Common Iron Pyrites or Soornamooky stone is exhibited in Magnesian Limestone from Kurnool, Cuddapah and Gooty. Radiated Pyrites in large pieces in black marble from Nundial and near Cuddapah. This is an important substance, and if procurable in large quantities, it might be used for the manufacture of sulphur, sulphuric acid, yellow and red ochres or polishing powder.

Iron Pyrites was also exhibited in small quantities in Aluminous shale from near Bangalore; where it is found in large quantities in this matrix, or if the alum slate be of a dark olive



green with the sulphuret of Iron diffused through it, Alum may be prepared from it.

(872) **IVORY.** A writer, in Blackwood's Magazine, (March 1853), on Zanzibar and the East Coast of Africa, says that tusks weighing 100lbs. each are common; those of 175lbs are not rare, and he had heard of a pair whose joint weight was 560 lbs.

(873) **IVORY VEGETABLE. VEGETABLE IVORY PLANT.** Vegetable ivory is now imported chiefly from the river Magdalena into Europe and the United States of America: in some years no less than 150 tons of it were imported into England. The nuts may be purchased in the toy shops of the British metropolis for a few pence each but when bought in large quantities they are obtained at a much cheaper rate. In August 1854, 1000 nuts were sold in London for seven shillings and six pence. The ivory plant is confined to the continent of South America where it grows between the 9th degree of north and the 8th degree of south latitude, and the 70th and 79th of west longitude. It inhabits damp localities such as confined valleys, banks of rivers and rivulets and is found not only on the lower coast region as in Darien but also on mountains at an elevation of more than 3000 feet above the sea as in Ocaña. Amongst the Spaniards and their descendants it is known by the name of *Palme de marfil* (ivory palm), whilst its fruit is called by them *Cabeza de negro*, (negro's head) and its seed *marfil vegetal* (vegetable ivory.) The Indians on the banks of the Magdalena term the plant *Tagua*; those on the coast of Darien, *Anta*; and those of Peru, *Pullipunta* and *Homera*. It is generally found in separate groves seldom intermixed with other trees or shrubs and where herbs are rarely met with the ground appearing as if it had been swept. The trunk is always pulled down partly by its own weight, partly by its aerial roots and thus forms a creeping caudex which is frequently twenty feet long but is seldom higher than six feet. The top is crowned with from twelve to twenty pinnatisect leaves, the entire length of which is from eighteen to twenty feet. The fruit, a collection of from six to seven drupes, forms clusters which are as large as a man's head and stand at first erect, but when approaching maturity its weight increasing and the leaf stalk which had up to that period supported the bulky mass having rotted away, it hangs down. A

plant bears at one time from six to eight of these heads each weighing when ripe about twenty-five pounds. The drupes are covered outside with hard woody protuberances formed in the same manner as those of the trunk of *Testudinaria elephantipes*. Each drupe contains from six to nine seeds but generally seven. The testa is thick, bony, the embryo peripheral, and placed near the hilum. Habit is nearly the only link which connects *Phytelephas* with the order of Palms, its simple spadix, its imperfect flowers, its indefinite number of stamens and its embryo situated in the axis of a fleshy albumen separate it from Palms and proclaim it (in conjunction with other characters which it presents) a member of Endlicher's class *spadicifloræ* and Lindley's alliance, *Arales*. Botanists enumerate four orders as belonging to that great division (*Pistiaceæ*, *Pandaneæ*, *Typhaceæ* and *Aroideæ*. To *Pistiaceæ* and *Pandaneæ* it cannot belong, because it has an exile placentation. Amongst *Typhaceæ* it cannot be placed, because it has a multiovular ovary: with *Aroideæ* it cannot be associated because it has a drupaceous fruit. Repelled by these and other considerations from placing it with any of the natural orders above mentioned and finding it impossible to trace out any relationship of it with any other group than the *spadicifloræ* we are compelled to adopt the views of Martius who looks upon it as the type of a new natural order (*Phyttelephanthææ*). The uses of the ivory plant may, as far as they are known, be summed up in a few words. The Indians cover their cottage with the leaves of it but only when those of palms are not procurable as the latter lasts much longer than the former. The seed at first contains a clear insipid fluid with which travellers allay their thirst; afterwards, this same liquor becomes milky and sweet and it changes its taste by degrees as it acquires solidity until at last it is almost as hard as ivory. The liquor contained in the young fruits turns acid if they are cut from the tree and kept sometime. From the kernels (albumen) the American Indians, as well as European turners fashion the knobs of walking sticks the reels of spindles and little toys which are whiter than animal ivory and equally hard if they are not put under water, and if they are they become white and hard when dried again. Bears, hogs and turkeys devour the young fruit with avidity—*Seeman* in *Botanical Magazine*, May 1856, page 192.\*

## J.

(874) **JAHEZ**, *Arab.* or **MAYNDHEE** *Hind.* a Mahomedan bride's bridal paraphernalia, which is carried in procession to the bridegroom's house.

(875) **JAINS.** The Jains are a sect of Buddhists,\* pread all over India, and many of their doctrines and ceremonies resemble those of the Brahmins, but the Jain, though he burns the

dead, does not make offerings to them, when the rite, called *Shraddhu*, is performed; for he says, "of what use is it to pour oil into the lamp, after the wick is burnt to ashes." The Hindoos believe that the soul of the dead must remain in purgatory for a certain time, that the performance of *Shraddhu* releases it after a given period, and

## JATROPHA CURCAS.

that by means of gifts to the Brahmin priests, the manes of the deceased is translated to heaven. Shraddhu means literally, firm faith, and is a ceremony that reminds one of the Roman Catholic masses for the repose of the soul of the dead. The Jains bear a very strong resemblance to the Buddhists in their religious doctrines; they believe that there is a God, but affirm that he can be known only by such as become absorbed in his essence; that therefore, a person knowing God, ceases to possess identity; that hence, it is absurd for a human being to pretend to know him. The moment you discover him, your identity ceases. They deny that God was ever incarnated, and, like the Buddhists, believe that men, by their virtuous conduct, became omniscient, and may thus be considered infallible. They hold, that since the beginning of time, only twenty-four such superior beings have appeared for the reformation of mankind; these they style the 'Tivithankar.' Their priests, the Jatis not only never put anything to death, but never eat anything that has had life. The Jains resemble the Hindoos, in having caste, which the Buddhists have not, in the Mysore and the south of India, the Jains admit also certain of the Hindoo deities into the courts of their temples, which is never done, either in Bombay, the Mahratta country, Guzerat, or Marwara, in all of which places there are numbers of Jains."

The Jains are easily recognized by their lofty turbans, and by the sectarian mark on their foreheads—a straight line of sandal-wood powder, drawn from the roots of the hair to the junction of the nose with the forehead. When they pray they cover their mouths with a cloth, lest they should swallow any insect, and gently brush the place where they intend to sit lest they should crush one. When they find a stray bird, or animal, they take the greatest care of it. Ward, in his work on the literature and mythology of the Hindoos, says, that the Jains carry this principle so far, that "they cannot allow that any crime justifies the taking away of life; hence like the Buddhists, they consider kings, as the administrators of justice, the greatest of sinners."—*Chow Chow*, p. 12 to 15.

(876) JAMBAN, the name of a tree in Canara. It grows from two to four feet in diameter and from twenty-five to forty feet in height. This wood, as also the kulbagi, is very scarce. It very much resembles mahogany and is generally used for house furniture.—*Edye, M. and C.*

## (877) JATROPHA CURCAS.

Physic nut, ENG.  
Pignon d'inde, FR.  
Brechnuss schwarze, GER.  
Dund berrie, ARAB.  
Coat amunaka, TAM.  
Pahari Arund, also Bagbarinda, HIND.

Bugla barendee, PERS.  
Rotenjot (paharee) INDIAN and CASHMERE.  
Nagalam, TEL.  
Kanana herundum, SANS.  
Adevie Amida, TEL.

This is one of the most common small trees

## JOHORE ARCHIPELAGO.

or bushes on the coast of Coromandel, and is in flower and fruit all the year.—*Roxburgh's Flora Indica*, Vol III. p. 687.

### The Seed.

The seeds of this species of Jatropha, are called in Tamil *Coat amanaka mootloo*, they are purgative, but very uncertain in their operation; proving sometimes violent like those of the *Ner-valum*, though they are naturally milder. Before administering them, they should be cleared from the thin filament in which they are closely enveloped; after which two or three may be taken as a dose. The leaves which are five angled, are considered as discutient, and the milky juice of the plant is supposed to have a detergent and healing quality.

### The nut.

The nut is called in Dukhanie *Junglie erundie ke beenge* and in Arabic *Dundebirrie*.

### The oil.

A fixed oil, (called in Canarese *Mara hara'n unay*) is prepared from the seeds of the *Coat amunaka*, which is reckoned a valuable external application in cases of Itch and Herpes; it is also used in chronic Rheumatism, and for the domestic purpose of burning in lamps.—*Ainslie's Materia Medica*, v. I, p. 73.

The milky juice boiled with oxide of iron, makes a fine black varnish.

(878) JATROPIA PANDURÆFOLIA. The juice is used by the natives to remove specks from the cornea.

(879) JAVA AND MADURA, two islands occupied by the Dutch in the Eastern Archipelago, for their civil Government are divided into 22 provinces or prefectures, known under the names of Residencies. The census of 1845, showed a population in Java of 9,542,045.—*No. 3, Jour. Ind. Arch.*

(880) JHILUM. The district of Jhilum as at present constituted, extends from the Jhilum river on the E. to the Attock on the W. On the north it is bounded by the various talukas of Rawalpindi as the public country, Potwar, Syud Kusran and Nurali, the river Suan and Pindi Gheb; on the south, its limit is the Jhilum river as far as Dhak, whence it stretches due west, being bounded to the south by the districts of Khushab, Mitta, Tuwanah and Kuchi. In this extent of 130 miles, with a range of hills traversing the centre, it is natural that the character of the country should vary much, the ravine country to the north, the hills of the centre, and the fine fertile plains to the south, are well marked distinctions.—*Jour. Ben. As. No. 1 of 1850*, p. 644.

(881) JOHORE ARCHIPELAGO. This extensive Archipelago is formed by the prolongation of the plutonic zone of elevation of the Malay Peninsula from Singapore to Billiton. These islands, with the exception of a few of the most southerly, formed the insular part of the kingdom



## KAF.

of Johore from the 13th century to the occupation, in 1820, of Singapore.

(882) JOOZ, *Arab.* A section of the Koran.

(883) JOQINI TANTRO, a work of high repute in Assam, its contents are supposed to have been communicated by Siva to his consort Parbati. It is stated, regarding the king Norok, that though an "Osor" infidel, he was in such favour with the gods that they made him the guardian of the temple Kamikhya. It is not improbable, that the temple was originally erected by Norok, but of this we have no certain evidence. The assertion made in the Tantro, however, would, at least, lead us to suppose that the temple was in existence in his days.—*Jour. As. Soc. of Ben. No. 1 of 1855, Robinson's M.S.*

(884) JUMBAGUM MARUM. *PTEROCARPUS* sp. Common about Nelambore and Wynaad, a large tree, wood used for building and fencing gardens, said to be durable.—*McIvor. M. E.*

## KALAYUM.

(885) JUMNOMUNDROO. This Nepaul tree bears yellow sweet-smelling flowers in branches; its leaves resemble those of the holly and the wood is, both in closeness of texture and colour, very like box.—*Smith's Nepaul.*

(886) JUNIPERUS EXCELSA. Pencil cedar of Kooloo.

Shoor, also Lewr, HIND. | Dhoop, HIND.

(887) JUNIPERUS COMMUNIS. Creeping Cypress of Himalayan travellers.

Purpinja, HIND. | Chee Chia, HIND.  
Budma, HIND.

(888) JUNIPERUS RECURVA.

Khoubair, HIND. | Ubhul, HIND.

(889) JUNIPERUS RELIGIOSA.

Googul, HIND.

(890) JUNIPERUS SQUAMOSA.

Pama, HIND. | Theloo, HIND.

## K.

(891) KACHULA CHULA, *Malay*, (instead of tandock) is the name given to hard horns or horn like parts of animals, believed to possess magical or medicinal properties. Lang Limu [ilmu] kahutan katungalan. The Malays cannot affix any definite meaning to the first two lines. The rendering would perhaps be [magical] science for protection when alone in the forest, or to make the offerer alone as when surrounded by a forest.—*Jour of the Indian Archl. December, 1847, page 309.*

(892) KADDA PILOW, the Tamil name of a tree, which is the river side Jackwood. It is inferior to the wood of that name: the natives use it for inferior purposes in small pattamahs and coasting-vessels. It is not of much value.—*Edye, M. and C.*

(893) KADIR WULLEE, a Mahomedan Saint whose tomb is at Negapatam. His Ooroos, is held on the eleventh day of the sixth month, Jemadi-ool-Akhir.

(894) KAF.

Koh-i-kaf, PERS.

*Mount Kaf*, is the fabulous mountain which, according to oriental cosmographers, surrounded the world (apparently to prevent those at the extremities from falling off,) but since the science of geography has made some progress in the East the name has been confined to Mount Imaus to the East, and Mount Atlas to the West. The Genii, a race intermediate between angels and men, produced of fire, are supposed to have inhabited the earth for several ages before the birth of Adam, and to have been governed by Kings, all of whom were called Soleiman (Solomon.)

They fell into a general state of depravity and were driven into remote places by Eblis (the fallen angel) and such as remained in the time of Caïumeras, the first of the Peisdadian dynasty of Persia, were by him driven to Mount Kaf.—*Journ. Ind. Arch., Vol. V, No. 9, page 548.*

(895) KAHLARU, the Malayala name of one of the jungle-trees. It grows to about seventeen feet in height, and seven inches in diameter; is very hard, close grained, and strong; and is used by the natives in boats, and for timbers, and knees in vessels.—*Edye, M. and C.*

(896) KAHOLO, a Nepaul Wood. Of the Kâholo, the poorer classes of the people, in time of scarcity, prepare a nutritious bread, which is sometimes mixed with flour.

(897) KAJAH, the Malayala name of a tree which grows to about eight feet in height, and ten inches in diameter; it is very strong, and the crooks of it are used by the carpenters for boat work.—*Edye, M. and C.*

(898) KAJUL.

Kajul, HIND.

Lamp-black.

(899) KALAYUM in Tamil, and Condle in Malayala. This tree grows from ten to fifteen feet in length, and from twelve to eighteen inches in diameter; its branches at the top are very thick; the wood is of a reddish cast, and much like the pencil cedar; it grows on the banks of rivers, but is not of much value for any purpose. The tree produces a fruit which I could not find was of use either to man or beast.—*Edye, M. and C.*

## KARANGELY.

### (900) KA-LING.

Ka-ling, BURMESE.

A tree grows twenty or thirty feet high, generally wild. The fruit is the size of a child's marble, used more as medicine than food.

(901) KALLOW MOW, the Malayala name of a tree which grows to above sixteen inches in diameter, and twenty feet in height. It produces a nut which is food for monkeys and other animals of the forest, the wood is used for various purposes, but is of little value.—*Edye, M. and C.*

(902) KALUDUMUM, the Tamil name of a tree which is remarkably heavy and very close-grained, and much resembles the English pear-tree wood; it grows to about eighteen inches in diameter, and from twelve to fifteen feet long: it is used for purposes where strength is required. I should expect that it is not very durable, or that it is not to be procured in any quantity, as it is but little known.—*Edye, M. and C.*

(903) KAMALAH, the Tamil name of a tree which very much resembles the wood in Ceylon named Halmille and Somendille; its growth is about thirty feet long, and two feet in diameter; it is used for much the same purposes as the other jungle-woods, in vessels and house-work; and the crooks are similar to the last-named.—*Edye M. and C.*

(904) KAMBALLOO, a product of an umbelliferous plant used by Burmese ladies as a cosmetic for the face.—*Cat. in M. Ex. of 1857.*

### (905) KAN.

Kan, BURMESE.

Is a shrub, three or four feet high, yielding a valued fruit which resembles a sweet grape.—*Malcom, Vol. 1. p. 52.*

### (906) KA-NA-ZOO.

Ka-na-zoo, BUR.

Soondry-tree. Vide (*Heritiera*.)

(907) KANDOBA. Is next to Wittoba, the most popular object of worship among the Mah-rattas, and his most famous temple is at Jejuri, near Poona.—*Chow Chow, p. 262.*

(908) KANGU VITTU, the Malayala name of a tree which grows to about sixteen feet high, and eight inches in diameter. It is one of the jungle-trees of the coast.—*Edye, M. and C.*

(909) KARA-KUNDLE, the name of a tree that grows in the Malabar and Travancore forests to about sixty feet in height, and two feet in diameter. It is used by the Arabs for masts of dowses, buggerows, donis, and patta-mahs. It is very strong, and is said to be durable; but must be considered heavy for the purposes to which it is applied.—*Edye, M. & C.*

(910) KARANGELY in Tamil, and Karakili in Malayala. This wood is very tough and of a whitish colour, and used by the natives for general purposes; many of the planks of the native boats are of this wood, and the edges are sewed together with Koir, with wadding on the

## KARLEN.

seams, and yarns crossing the joints, for the purpose of making the boats pliable in the surf, as it would be useless to fasten them with nails, &c. for the services for which they are required.—*Edye M. and C.*

(911) KAREN. A race scattered throughout the Burmese, throughout all the wildest and most secluded parts of Pegu and Martaban as well as Tenasserim, and the western parts of Siam. There are two tribes known, one of these call themselves Shos, but are called by the other tribe "Pwos" and by the Burmese Meet-khyeens, or Talain karens. The other tribe call themselves Sgaus, but by the Burmese are designated Meethos, or Burman karens. They are most populous in the Bassein district, where they form the great bulk of the agricultural population, the Burmese and Talains being principally small traders, fishermen and mechanics. After the cession of Arracan to us, the Karens spread largely over the hills into the district of Sandowa. In the northern parts of Pegu, on the side of the Irawaddi, the Karens are few and sparse and they have not been heard of further north in Burmah than the district of Tsalen.

(912) KAREOVAM, the Malayala name of a tree which grows to about eight inches in diameter, and twelve feet long. It is generally curved, and used for the frames of native vessels, and for agricultural purposes. It is known as jungle-wood.—*Edye, M. and C.*

(913) KARINCOLU in Tamil, and Karinjurah in Malayala. This tree grows to twelve or fourteen feet long, and twelve inches in diameter; it is of a whitish cast, and not of much use or durability. It produces a fruit which the natives eat in a raw state.—*Edye, M. and C.*

(914) KARINDAGARAH, the Tamil name of a tree which grows to about forty feet in height, and eighteen inches in diameter. It is used by the native carpenters in house and ship-building, and for various purposes. It is not found in any quantity, and consequently it is not much known.—*Edye, M. & C.*

(915) KARINGATTA, the Malayala name of a soft, light wood, which is preferred by the natives for the soles of sandals, &c. It grows to about twelve feet high, and eight inches in diameter. It produces a fruit from which oil is extracted. This, with the leaves of the tree, is used for gout and rheumatic pains.—*Edye, M. and C.*

(916) KARLEN. Here, as also at Junir on the Ghauts, and Kuden or Korah in the Concan, as also at Kanheri and Nasik, are caves containing inscriptions in Deva nagari, known as Sahyadri. These contain inscriptions, excavated at various dates from before Christ 200 years, to A. D. 460, the oldest, those at Karlen and the newest those at Kuden, in the Concan, the seven centuries during which Buddhism flourished in western India, while the modern Hindu system was



silently moulding itself into its present form, and preparing to take the place, at a somewhat later period of the religion of Buddha, and to exhibit that compound of Vedic pantheism and Buddhistical tenderness for animal life and indigeneal superstition that is now current in India.—*Dr. Stephenson in Bom. As. Soc. Jour. No. XIV. Vol. V. of 1854.*

(917) KARNARA VETTE, the name of a wood which the native carpenters use for boat work, and small vessels. It ranks amongst the numerous jungle-woods, and grows only to twelve inches in diameter, and about fifteen feet high. It is not of much consideration as to quality, quantity, or durability.—*Edye, M. and C.*

(918) KARNATAGARAI, in Tamil and Malayala. This tree is a close-grained firm wood; when old it resembles the Vitte Marum, or black wood of Malabar, known in England by the name of Bombay black or rose wood. It grows from twenty-five to thirty-five feet long, and two feet in diameter; it is used for furniture and house-building: it grows straight, and is found in patches on the Ghats, east of Cochin.—*Edye M. and C.*

(919) KARROO VAGOO: PTEROCARPUS, Sp. A very common tree on the western Ghats, wood strong, durable and much used for building.—*M. E. J. R.*

(920) KATHUKEVI, the Tamil name of a tree which grows in Travancore. It is very buoyant, and is generally used for rafting the heavy timber from the forests; and also for catamarans and canoes, as it is easily worked, and obtained without much trouble, and of all dimensions. It is not very durable.—*Edye, M. and C.*

(921) KAYANS. Mr. Dalton states that the Kayans amount to 270,000 souls, and that they were greatly addicted to head hunting.

This people inhabit the North-West of Borneo, in the interior of the country comprised between the rivers Baram and Rajang, which with the small rivers intervening allow the Kayans access to the ocean. The mongrel malays occupy the coast, and the country between them and the Kayans is occupied by eleven other tribes in number each about 500, the majority of whom are subject to the Kayans. The Kanawit tribe closely assimilate to the Dyaks of Saribas, whose neighbours they are. The tribes Punan, Sakapan and Kajaman are the chief collectors of camphor and birds nests. The Kayans are a nation of prostitutes, they are not so passionately fond of skulls as to bequeath them as fortunes to their children as is said of the Dyaks. They continue human sacrifices, but to a less extent. The Kayan name for God is Tanangan, whom they hold to be invisible and supreme. The coal and iron fields of the Balawi or Rajang are more extensive than any yet discovered on the Island. From the river Baram, coal is traced

to the upper parts of the Bintulu, and thence southward to the Rajang river, on the left bank of which at Tujol Nang, there is a seam exposed upwards of thirteen feet in thickness. *Mr. Burns in Feb. 1849, No. of Jour. Ind. Arch.*

(922) KEADIE, or perhaps, HEADIE, the Malayala name of a tree in the forests of Canara. It grows from eighteen inches to two feet in diameter, and from thirty to fifty feet high. It is a close-grained wood, and is said to be durable; but it is rather scarce.—*Edye, M. and C.*

(923) KEE. Burm. *Syndesmis lavoyana*, of Wallich.

(924) KERBELA or Mesched Hoossein, is situated a short distance from the West bank of the Euphrates, and not very far from Hillah, the supposed site of Babylon. It is surrounded by gardens and groves of palm trees which are watered by a canal from the river. The chief object of interest is the Mosque, built in the reign of Shah Abas the Great, on the spot where Hoossein the son of Ali, nephew of and son-in-law of the Prophet, was murdered. It is a sacred place of pilgrimage and burial to the Persians who are Sheaites, that is who acknowledge the Caliphate of Ali: by the Turks, however who are Sounites, and do not believe that Ali was the rightful Caliph, it is held in no peculiar veneration, hence though no Christian is allowed to enter the precincts of the Mosque, a Turk whose house overlooked the court, made no objection to a traveller going up on his roof and making a sketch. Kerbela fell into the power of the Turks when Sultan Murad IV. took Baghdad A. D. 1636.

The Persians frequently send their dead to be buried at Kerbela, from the interior of the country. On leaving Kerbela the traveller met nine mules laden with coffins, and while at Baghdad he often saw others passing to their last resting place near the honoured remains of the grandson of the prophet.

(925) KERBELA. In India, a plain near the sea or any river or tank, whither the Mahomedans annually carry their Taboots.—*Herklots.*

(926) KEWN, Burm. Teak. *Tectona grandis.*

(927) KHAKSI. A curious Nepaul shrub called the Khaksi, the leaf of which answers the purpose of emery or sand paper, giving a fine polish to the harder woods.—*Smith's Five Years in Nepaul, p. 68.*

(928) KHIZR. Khaja khizr, a festival held in Northern India on the Fridays of the month Shaban, said to be in commemoration of Elisha or Elijah.

(929) KHONNAY, in Tamil, Kakay in Malayala and Carnataka. This tree grows to thirty feet long and from twelve to eighteen inches in diameter; it is curved in growth; is rather close-grained and heavy; and very much resembles the Maragosa in Ceylon; but it is rather scarce

## KORINGI MARAM.

on the coast of Malabar. It produces the pod known by the name of *Cassia fistula*, or Banda lotte, which is considered an excellent purgative in case of habitual constipation, both by natives and Europeans.—*Edye, M. and C.*

(930) KHUTEEB, ARAB. A mahomedan preacher who reads the Khootba.

(931) KIAONG, the name given in Burmah to the monastery houses of the Phongis, or Bhudist Priests or monks.

(932) KINA BALOW, a mountain near Bawang, in the Archipelago estimated between 13,000 and 14,000 feet in elevation.—*Journ. Ind. Arch.*

(933) KIPPONG, a tree, the bark of which is chiefly used, both at Johore and by the Berman tribes, for the sides of their houses.

(934) KITE-FLYING is a pastime universally practised amongst the Chinese, who excel all other people both in the varied forms of their kites and the heights to which they can make them rise. They are constructed of paper made of refuse silk and bamboo. They assume every possible shape, and sometimes it is impossible when they have reached the culminating point, to distinguish them from birds. By means of round holes, supplied with vibrating cords, on which the current of the air acts, the kites when ascending, issue a humming noise, similar to the hum of a swarm of bees.

(935) KOIK-PAH, the Malayala name of a tree which answers the purpose of small spars for native vessels: it is said to be strong and durable for such purposes.—*Edye, M. and C.*

(936) KOOKIE. In a *slight notice of the Grammar of the Kookie language*, by Lieut. R. Stewart, 22nd Regiment B. N. I., he says that the people to whom the term Kookie is given by the inhabitants of the Eastern Frontier of Bengal, occupy, together with other tribes, the hilly tracts lying to the North, South and East of Cachar, and Manipoor: they are divided into numerous clans each under a petty hereditary chief or Rajah.

The appellation of Kookie is unknown among themselves, and they have no title embracing their whole race, but they call one another by the names of their different clans.

They all speak the same language, with very slight modification in the dialects, and it is called among them Thadou Pao, from the name of one of their principal clans.—*Jour. Beng. As. Soc. No 3 of 1858.*

(937) KORAH, a short but heavy Nepaul weapon of a half moon shape, the edge of which is on the inner side like that of a scythe.—*Smith's Nepaul, p. 170.*

(938) KORA-KORUM. A pass in the chain of Kuen-luen, 18,300 feet high.

(939) KORINGI MARAM, or Horingi-maram, the Tamil name of a tree which produces the soap-nut, or rather the soap-apple, which the natives use as a substitute for soap. This tree is

## KURVAH TANGA MARAM.

common on the Malabar Coast, and grows to about eighteen inches in diameter, and twenty feet long. It is used by the carpenters for many purposes. There is another sort named Horingi Tanga Maram, which is the jungle or wild soap-tree. The apple is very inferior in size and quality to the former, and the tree nothing more than jungle or underwood. The soap-apples are gathered and sold in the bazar at all seasons of the year, and answer the purposes of soap for washing.—*Edye, M. and C.*

(940) KUB-LO-WAH. Burm. (*Laurus*).

(941) KUBO, is the name applied to the Shans in the Manipur language.

(942) KUEN LUEN, a chain of mountains in Thibet, which are as lofty as the Himalayas, where the chain forms the western boundary of Thibet.

(943) KULBAGI, the name of a tree in Canara. It grows to fifteen or twenty-five feet in height, and from twenty-four to thirty-six inches in diameter. It is a close-grained, hard and durable wood, and is used by the natives at Mangalore and Honore for the keels and beams of vessels. It is of a dark colour, and is considered valuable.—*Edye, M. and C.*

(944) KULMAH, Arab. THE CREED or the Kulma shahadat, used by the Mahomedans means "I bear witness that there is no deity save God, who is the one and has no co-equal; and I bear witness that Mahomed is his servant and is sent from him."—*Her. k.*

(945) KUNDU PALE, or Hundu Pale, a tree which produces a fruit. It grows to about eighteen inches in diameter, and twenty feet high. It is not of much use excepting for its fruit, which is eaten by the natives and by wild animals.—*Edye, M. and C.*

(946) KUNJEERAM MARUM or POISON TREE. *Strychnos Nux-Vomica*, a small tree very common about Nelumbore, wood strong and elastic, much used for tool handles.—*M. E. J. R.*

(947) KUN-NE-AN. Burm. (*Myristica*.)

(948) KUN-NYIN-BEN, and KUN-NYIN SE, Burm. (*Dipterocarpus*.)

(949) KURBEE, Hind. This name is given to the stalks, cut small, of the sufaid Joar, or Saonulee, the Sorghum vulgare, and in this state is extensively used for feeding cattle.

(950) KURUTU-PALAH, the Malayala name of a tree which grows to about eighteen feet long and eight inches in diameter. It is very close in its grain, and remarkably hard and strong. It produces a fruit which is eaten medicinally; but the wood is not much used in consequence of the labour required in working it.—*Edye, M. and C.*

(951) KURVAH TANGA MARAM, which is the wild cinnamon-wood tree of the jungle. It grows to about twenty or thirty feet high, and from twelve to fifteen inches in diameter: it is



very scarce, and consequently not much known or used.—*Edye, M. and C.*

(952) KYET-MOUK, *Burm.* or COCKSCOMB, is a moderate sized tree, found wild in

most parts of the Burmese country. The fruit is red, sour, and the colour of a cock's-comb, and has similar corrugations on the skin. It hangs in grape-like clusters.—*Malcom, VI, p. 181.*

L.

(953) LABUAN. *Report on the Geological Phenomena of the island of Labuan and neighbourhood. By J. Motley, Esq. in the Journal of the Indian Archipelago, Vol. VI. No. 10.*

The island of Labuan on the N. W. coast of Borneo, and now a British settlement, is in shape, a sort of triangle, of which the longest side, running about N. E. and S. W., is 11 or 12 miles in length and approaches a straight line. The coast line is, for the most part, flat and sandy, although in one or two places, low cliffs abut upon the sea and at about the centre a sloping cliff, 100 feet high or more, leads out to a long sunken ridge of rocks, terminated by a rocky islet named Lyang Lyangan. At this point, deep water may be found up to the beach; but elsewhere shoals and coral reefs extend to a great distance from the land. The southern side of about 6 or 7 miles in extent from E. to W., is indented by a broad bay having for the most part very shoal water, from the bottom of which a considerable stream, the China river, pursuing a very tortuous course through mangrove swamps but in a general N. and S. direction, divides the island for about 2-3rds of its length into two nearly equal parts. Victoria harbour may be considered a part of this bay, for it is probable, though not certain, that the mangrove swamp at its head is continuous or nearly so with that bordering the China river, so as to separate the range of low hills on the west of the harbour from the rest of the island. From the opposite sides of this bay two ridges of hills, probably nowhere more than 200 feet in height, converge towards the head of the China river, the most elevated parts probably occupying about the central lines of the two divisions and forming the water-shed between the central mangrove swamps and the ravines of the eastern and western shores. Besides the main central drainage of the China river, there are upon this coast several minor creeks, dignified by the name of rivers, which penetrate but a short distance into the jungle.

The dependant islets of Labuan, with the one exception just mentioned, all lie to the south, and proceeding from W. to E. are as follows:—Pulo Kuraman, consisting of a long low ridge and a good deal of sandy beach, is about  $1\frac{1}{2}$  miles in length and is situated a little to the S. W. of Tanjong Kiamsana the west

point of Labuan. Eastward of it is Pulo Burong, opposite the mouth of the China river, a round mass of limestone rock about 50 or 60 feet high. Off Tanjong Ranche Ranche, to the west of Victoria harbour, is Pulo Belulang, a small limestone rock, and south of it is Pulo Enoo, a small hill surrounded by extensive sandy tideway. On the east of the harbour entrance lies Pulo Kulin Pappan, a small ridge with sandy beach on each side, and connected by a line of rocks, for the most part sunken, with Pulo Daaf, which is the largest of the islands, being 4 or 5 miles in circumference, and containing several hills 80 or 90 feet high. Still eastward and in the mouth of the Kalleas river, passing over an island named Labungan, is Pulo Malan Kassam, which by some mistake in the naming of the early charts was ceded without the intervening island. All these islands are nearly in a straight line. To the southward of Kuraman are Oosookan Kichil and Oosookan Besar, rocky islets with a little flat sandy plain and surrounded by very foul and dangerous ground.

The eastern side of the island forms also a shallow bay almost filled with coral reefs and sand banks, and partially fringed with mangroves. Towards the north another smaller river, the Gangarak, drains a considerable extent of country, chiefly swampy, producing a luxuriant vegetation of various palms and mangroves, and the greater part of it hardly elevated above the level of the sea. Its sources are, for the most part, to the southward of its debouchment, though one small branch runs in a northerly direction, and they are divided from those of the China river by the united northern extremities of the two ridges before mentioned, which are here, for the most part, very low.

The measures of which the whole island is composed are alternating clays and sandstones, with all the intermediate modifications usually found in an English coal field, but having throughout the appearance of having been exposed to much less pressure and condensation. Coal occurs in several places, and the veins appear to be associated in groups. In one place five, in another three veins (one very small) are distributed in a very small space of ground, and in each case, the containing group of clays is placed between two very thick

## LAC.

beds of sandstone. The clays are usually very slightly laminated, excepting where they are alternated with sandstone in excessively thin beds, a formation rather common. They are also much less carbonaceous in general than the corresponding members of the Welsh and north of England coal fields, but to this there are some exceptions. One bed of blue shale, apparently of considerable thickness, yields in several places small springs of dark coloured but tolerably pure petroleum. This bed is in perpendicular depth some 400 or 500 yards below the principal coal seam. No regular beds or veins of ironstone have been detected though the clays frequently contain nodules of argillaceous iron ore, sometimes in nearly continuous courses. These nodules are often septarian, and are filled with crystallized but very friable carbonate of lime. Small masses of arsenical pyrites are also sometimes enclosed in them, as well as in the clays themselves. These nodules when exposed to the air, appear in the course of a great length of time, to become converted into a red oxide of iron of various degrees of hardness, from a powdery yellow soft substance, to a dense dull purple cavernous stone of vitrified appearance, capable of striking fire with steel and closely resembling the laterite of Singapore. The whole surface soil of the island and the beds of most of the streams are more or less covered with scattered masses of this substance. It is also found on the main land, and is the ore from which the Kadyans and Moorats, native tribes in the neighbourhood of Brunei, manufacture their iron.

The coal is of very good quality, hard, dense and with a fracture inclining to conchoidal, and is remarkable for having dispersed through its substance masses of imperfect amber, sometimes light yellow and very transparent, sometimes approaching to black and in a semi-carbonized state, but always extremely friable and brittle; when burnt it diffuses the fragrant smell of recent resin, and is in a sufficiently perfect state to be collected by the workmen and used with fresh dammar in making torches. In some seams of coal on the river Bintula, to the south of Brunei, the late Mr. Burns mentioned that almost half the seam consists of this substance, which is there commonly dug and used by the inhabitants as dammar. Specimens of coal from Ritch, on the east coast of Sumatra near the Indrageri, contain much of this substance.—*J. Motley Esquire, in Jour. Ind. Arch. Vol. VI. No. 10, Oct. 1852.*

(954) LAC. The lac which is largely exported from Burmah, is obtained chiefly in the Shyan districts. It is the product of an insect, (*Coccus lacca* of Linnaeus,) which exudes the gummy matter upon twigs, to protect its eggs, and creates a sort of habitation. It lives on

## LAMPONG DISTRICTS.

various trees; in Assam, chiefly on the *Ficus religiosa*.—*Malcom.*

(955) LA-HOUL-O-LA-QOOWUT, &c. *Arab.* Meaning there is no power or strength but in God, these are the commencing words of a Mahomedan invocation.—*Herk.*

(956) LA-IL-LA-HAH, IL-LUL-LA-HO, *Mahomed oor-Russool Oollahay*, which signifies there is no other deity except the one true God, and Mahomed is the prophet (or messenger) sent by God.—*Herk.*

(957) LA-MOO, *Burmese.* Is a small tree, like a willow, growing only near salt water, and generally on the very edge, twelve or fifteen inches in diameter. The blossom is very beautiful, a little like a thistle, very fragrant, pale-green, large umbrella-shaped pistil, innumerable stamens, no corolla, but a thick calyx, which remains, and holds the fruit like a dish. Monkeys are fond of the fruit, and are often seen in the tree. The natives use it in curry. Timber useless.—*Malcom, Vol. I, p. 181.*

(958) LAMPONG DISTRICTS OF SUMATRA. The size of these districts is about 12,926 square English miles. Their maritime boundaries are formed on the South by the Indian Sea and the Straits of Sunda, and on the East by Java, whilst the rivers Masuji and Pisang bound it on the north and west.

Tobacco is planted here and there, but it does not constitute an article of export. The leaves do not grow very large, but have a fine flavour. The inhabitants of the Lampongs deem their tobacco better than that of Java and will not buy or use the latter. It is probable that the difference consists more in the preparation of the produce than in the plant itself. In the markets, tobacco is sold according to the weight of the copper money, i. e. the buyer receives for his copper money, as much tobacco as the doits weigh.

The forests produce some articles of merchandise, which are of great importance to such a poor country. The first of these is the rattan both the pliable rattan and the cane, which are found in considerable quantities, and which are exported to Singapore as well as to Batavia. The cane (*calamus rotang* L.) is called in the Lampongs "*semambu*." In a botanical point of view the country is very rich in species of these, and allied genera. The inhabitants of Tarabangi enumerated besides the *Semambu*, the following species:—

2	<i>rotlan bubwar</i> or <i>bubar buwar.</i>		
3	„ <i>bunkua.</i>	10	„ <i>Lakki.</i>
4	„ <i>Kommoran.</i>	11	„ <i>Sabuk.</i>
5	„ <i>Semuly</i> or <i>jemang.</i>	12	„ <i>Peledes.</i>
		13	„ <i>Sessak.</i>
6	„ <i>Suti.</i>	14	„ <i>Tungal.</i>
7	„ <i>Urang.</i>	15	„ <i>Bobras</i> and
8	„ <i>Balk.</i>	16	„ <i>Manu.</i>
9	„ <i>Kayu.</i>		



## LAMPONG DISTRICTS.

The *calamus draco* L., is only first found further to the north-west, for example in the plains of Palembang; at all events not on this side of Tulang Bawang.

The country is unusually rich in plants which yield gum, and that not only for trade but for daily use in the houses of the inhabitants. The kind of gum most sought for is the "*dammar kacha*," also called "*dammar mata kuching*." The extraordinary high price which this article for some years maintained in the European market, has now fallen considerably, and during my sojourn at Telok Betong some prahus laden with dammar returned from Batavia because dammar could only be disposed of there at unusually low prices. The greatest use is made of some other sorts for candles and flambeaus, as scarcely any oil is burnt in the interior. Some periods of the day are even named according to the time of lighting the rosin flambeaus. In Tarabangi I heard the names of the following kinds of dammar, or rather I have to thank Mr. Juch for the communication of these names, viz.

1. *Dammar kacha* or *mata kuching*. From a high tree which grows in the vicinity of the southern coast.

2 *Dammar kuyung* used for flambeaus.

3 „ *Assem.* 6 „ *Hulu tupay.*

4 „ *Barinti.* 7 „ *Bunu.*

5 „ *Seburu.* 8 „ *Karuwing* or *bangbang*. Probably the thick oil, tough and quickly drying of the *Hernandia sonora*, called "bunka" by the Bugis. Could we not employ this in making tea boxes?

9 *Dammar tahala.*

10 „ *Selunay*, from the *Mengarawan* tree, which is the wood most sought after in the Lampongs for building. I could not classify it botanically.

11 *Dammar tambikat.*

12 „ *Sali-siep.*

13 „ *Kenbutul.*

14 „ *batu* or *serem* for flambeaus.

15 „ *dagin meira*, which runs of itself from the trunk.

16 *Dammar Mahalu*, makes a good cement.

The Lampongs possesses three species of ape which are not found in Java. The *Orang Outan* appears to be even less native than on Java. Besides tigers and panthers, two smaller species of cats also occur, which are strangers to the island of Java, as also another kind of *Viverra* and *Mustela*. The Malayan bear and the elephant are also wanting on Java. In place of the rhinoceros of the last we find there the *Rhinoceros sumatrensis*, and in place of the *Cervus russa* we find there the *cervus equinus*.

The *tapir* probably has his habitat towards the frontiers of Palembang, and on the other hand the *banteng* (*Bos sundaicus*), which is spread over the whole of Java, is wanting.

The bear is called "*gemol*" in the Lampongs.

## LAMPONG DISTRICTS.

The beautiful *Argus pheasant* occurs, which it is difficult to export, because it easily sickens and dies on the voyage. Its eyes are first affected, afterwards follows a complete blindness, then a swelling of the whole head and throat, and shortly afterwards it dies. The natives call the bird *ku-wau*. Its manner of living agrees entirely with that of the peacock.

The inhabitants of the Lampongs are aborigines in the true sense of the word, because there are very few strangers there. There are Europeans at Tarabangi, 2 or 3 Chinese at Telok Betong; Bugis and Javanese on the coast and at the places where most trade is carried on. Of the foreigners the Bugis are most numerous, and they principally reside at Telok Betong, Mengala and Siring Kebo. The true aborigines of the Lampongs differ little from the Sundanese on Java, and clearly belong to the same race. They are not larger and are less muscular than the latter. In particular we do not find amongst any of them the round broad faces, short legs, and the coarse large feet, which are so frequently met with amongst the Sundanese. The difference is most marked in the female sex, who are favourably distinguished in the Lampongs by finely formed feet and hands, by a fairer colour of the skin and a softer and slightly pensive expression of the eyes. That the colour of the skin is less dark brown, may be ascribed to the circumstance that the female sex pass the greater part of their lives in well closed houses. The dress of the men is exactly the same as in the west of Java.

The Lampong fair ones delight much in finery, which however they only wear so long as they remain unmarried. As wives they do not make any further use of their ornaments. We find:

1st. *Bands for the forehead*, which consist either of resin-beads strung together and covered with silver or gold and are called *jelemeni*; or are made of a thin stripe of bambu to one end of which their gold leaves are sewed while the other remains loose. This kind is called *kembany pandan*. A cincture of gold leaf in the form of a hoop is called *Kandu Keda*.

2nd. *Bracelets*.—These, which consist of the before mentioned beads, are called *piko*: those of gold and silver leaves, *gale pepe*; those of resin rings covered with gold, *gelang*.

3rd. *Necklaces*, of gold leaf or silver leaf, gold and silver thread, *tad gala*.

4th.—*Bangles*, or ankle rings of gold or silver, *gale chalu*.

5th.—*Eur-needles*, with gold or silver crowns, *chundok*.

6th.—This is not yet the whole. A girl who would be fully adorned, must affix silver nails to her fingers. There are very short ones called *singai*; and very long ones, which look like claws, called *tanggai*, which are principally used in dancing.

# LAMPONG DISTRICTS.

# LAMPONG DISTRICTS.

All the houses in the Lampongs stand on high posts. They are built so beautifully, so strongly and so fitly, especially in the interior of the country, that we cannot sufficiently admire the patience, activity and art of the inhabitants, particularly when we consider what small me-

chanical means the builders have at their service and how few and rude are the instruments which they employ. The houses consist altogether of wood with the exception of the floor, but including the roof, which is made of good shingles (*airaps*).—*Jour. Ind. Arch. Vol. No. 12.*

## Exports from the Lampong Districts in the year 1843.

From whence	PEPPER.		Coffee.	Cotton.	Dammar Kacha.	Kollet or Caoutchouc.	Puleh Sahari.	Kulit Glam.	Kayu Kamuning.	Rattans.	Canes.	Wax.	Rhinoceros Horns.	Elephants Tusks.	Sarung Barong.	SABONG.		Tressi.	Tripang.	Silver money.	Copper money.
	White.	Black.														White.	Black.				
Telok Betong.....	1,072	389	2,427	4,660	4,013	188	89	20	43	4,248	25,774	8.05	13	2.89	832	38	15.4	384	21	1,175	29,717
Mengala.....	615	...	968	163	276	...	1	...	...	2,540	33,800	23.02	8	3.70	...	...	...	3	...	60	1,600
Siring Kibo.....	29	173	2,349	125	282	...	...	11	...	3,691	6,120	10.85	3	0.98	...	...	...	...	...	...	700
Total...	1,716	562	16,746	4,948	4,571	188	90	31	43	10,479	65,694	41.92	24	7.57	832	38	15.4	387	21	1,235	32,001
Of which to foreign Ports.....	1,062	6	1,137	6	10	...	1	...	1	...	15,850	...	8	...	68	14	10.4	...	11	...	...

Explanations.—*Kollet* is the native name for Kaoutchouc. *Puleh sahari* is the bark of the *Alyria stellata*, which is much used in the Archipelago as a medicine. *Kulit glam* is used by leather-carriers. *Kaya Kamuning*, the wood of different *Murraya*: it is used for scabbards and handles of weapons, principally of Krisses. The export of pepper increased in 1844.

The import of money in the same year amounted to:—

	Silver.	Copper.
Telok Betong—Java Rupees	550	51,633.
Mengala	...	3,616.
Siring Kibo	...	12,435.
	550	67,684.



## LEAD.

(959) **LANTERN FEAST.** The feast of lanterns, amongst the Chinese, takes place on the first full moon of the new year. It affords opportunity for a display of ingenuity and taste, in the construction and mechanism of a variety of lanterns made of silk, varnish, horn, paper and glass, some of which are supplied with moving figures of men galloping on horse back, fighting, or performing various feats, together with representations of birds, beasts and other living creatures all in full motion. The moving principle in these is formed by a horizontal wheel, turned by the draft of air created by the heat of the lamp, and the circular motion is communicated in various directions, by means of fine threads attached to the moveable figures.—*Davies.*

(960) **LARIX GRIFITHII**, "Sah", HIND. This Himalayan Larch splits well, and is the most durable of any; but the planks are small, soft and white.—*Hook. Vol. II. p. 45.*

(961) **LAURUS** (The *Kullowah* Bur.) is an inferior sort of camphor-wood. Bark fragrant.—*Malcom's South Eastern Asia, Vol. 1, p. 191.*

(962) **LAURUS PARTHENOXYLON**. (*W. J.*) *Enneandria Monogynia. Kayo Gadis.* Malay. This is a lofty timber tree, abundant in the forests of Sumatra. This species has considerable affinity to *L. cupularia*. The fruit has a strong balsamic smell and yields an oil, which is considered useful in Rheumatic affections, and has the same balsamic odour as the fruit itself. An infusion of the root is drank in the same manner as Sassafras, which it appears to resemble in its qualities. The wood is strong and durable when not exposed to wet, and in that case considered equal to teak. Kayo Gadis signifies the virgin tree, whence the specific name.

May this be the oriental Sassafras wood mentioned under the article Laurus in Rees' Cyclopædia.—*William Jack in Calcutta Journal of Natural History, Vol. V. p. 354.*

(963) **LAVENDULA CARNOSA**. Lin.  
Karpoorawullie, TAM. | Vurdefrasoon, ARAB.  
Silake, pungerie, DUK. | Barage, SANS.  
*Ainslie, p. 253.*

(964) **LAZ-UN**, Burm. *Pongamia atropurpurea*.)

(965) **LEAD.** The old Lead Mines of Kohel lie near the Red Sea, a day's journey N. by E. from *Gebel Zubara*, in about Lat. 24° 40'. Not far distant are the Lead Mines of *Gebel Rassas*, lit. Mountain of Lead.

The Mines are situated about 1½ mile from the W. shore of the Red Sea, as before observed. The ore, galena and carbonate of lead, occurs in an argillo-siliceous schist, associated with small quantities of sulphur and iron—a poor carbonate. A Bey visited seven excavations, which are mostly from three to four feet broad, about five feet high, and run down in inclined planes cut in steps. Galena was found in the shaft worked by Brochi; but the indications discovered

## LEPUS HISPIDUS.

are not considered favourable. Besides other minerals, titanated iron, manganese, zinc and fire-clay have been discovered here. The surface of the rock between the mines and the shore is coral limestone, covered with a gravel of granitic gneiss, porphyry pebbles.

The mines were worked by the ancients; and the ruins of an old, but not extensive station still exist, in detached buildings of loose stones and foundations—some round,—others square. Water is brought from *Gebel Egleh*, or *Edjleh*, four or five hours' distance.—*Newbold.*

(966) **LEEZAN**. The village of Leezan consists of scattered houses on the side of a hill which slopes down to the river Zaab.

A mountain stream empties itself into the river at the foot of the village, which it separates from the church.

During the massacre of the Nestorians by the Koords, the inhabitants of Leezan took refuge upon a platform on the rock above the church, where they defied all the attempts of Beda Khan Bey to dislodge them. But being at last starved out, they capitulated on the understanding that they were to surrender their arms and property, and their lives to be spared.

The Koords on being admitted to the platform and having taken the arms, commenced an indiscriminate slaughter, but few persons throughout the entire valley escaped this terrible massacre.

(967) **LEP-HAN**, BURM. Grows everywhere in the upper provinces, and is one of the largest trees in the country, often ten and twelve feet in diameter. The ripe seeds are contained in pods, enveloped in a fine cotton, of which mattresses are commonly made. Both blossoms and fruit are eaten when young, chiefly in curry. Timber inferior.—*Malcom, Vol. 1, p. 181.*

(968) **LEPUS HISPIDUS**. PEARSON: *CAPROLAGUS HISPIDUS*, Blyth, *the Hispid Hare of the Saul forest*. Habitat. The great forest at the base of the Sub-Himalayas and of their off-sets, from Gorakpur to Tipperah.

This primeval forest is the peculiar and exclusive habitat of the Hispid Hare, a species that never ventures into the open plains on the one hand, or into the mountains on the other; and hence it is so little known, deep cover and deadly malaria contributing alike to its happy obscurity. As the black-necked Hare or *L. Nigricollis* is the single species of the Deccan, and the Redtail, *L. Ruficaudata* of Hindostan and Bengal, so is the Hispid of the vast Sub-Himalayan forest; and it is remarkable that the mountains beyond the forest, even up to the perpetual snows, have no peculiar species.

The Black Hare or Saul forest Hare, both excellent names—feeds chiefly on roots and the bark of trees, a circumstance as remarkably in harmony with the extraordinary rodent power of its structure as are its small eyes and ears, weighty body and short strong legs, with what

## LEPUS SINENSIS.

has been just stated relative to the rest of its habits. The whole forms a beautiful instance of adaptation without the slightest change of organism.

The sexes are as near as possible of the same size and colour; but, if anything, the male is rather the larger and darker. The male measures  $19\frac{1}{2}$  inches from snout to vent—head to the occiput, 4.; ears to the lobe  $2\frac{7}{8}$ ; to the crown  $2\frac{3}{4}$ ; foreleg from elbow to end of longest toe nail  $4\frac{5}{8}$ . Hindleg from true knee to longest nail  $7\frac{1}{2}$ ; Planta from heel to long toe-nail  $2\frac{7}{8}$ ; heel to knee  $4\frac{1}{4}$ ; scut only  $1\frac{1}{8}$ ; scut and hair  $2\frac{1}{8}$ ; weight  $5\frac{1}{2}$  lbs. The female is 19 inches long and  $5\frac{1}{4}$  lbs. Both have a girth behind the shoulder of 12 inches: but the female's tail is the longer, being 2 inches, or 3 with the fur. Her other proportions are almost identical with the male's. Compared with the common species, which lies beside them as I write, these animals are conspicuously of darker hue and heavier make, but not larger. They have heavier heads, much shorter ears, smaller eyes, shorter tails, limbs shorter, stronger and less unequal—in that respect like a rabbit—and, lastly, their mystacial tufts are much less, and their fur much harsher. Looking closer into their structure it is observable that the profile of the head is less curved in the Hispid than in the common species, the nails somewhat larger, and the digits slightly different in gradation, the thumb in particular being less withdrawn, and the little finger more so, from the front, in Hispidus. But the nails have no peculiarity of conformation, and so far from being "very acute," they are very blunt and worn. The nose and lips agree precisely with those of the common species: but the eye is conspicuously smaller, and placed less backwards, or midway between the snout and ears. The ears both in male and female considerably exceed one half of the length of the head, and are broader as well as shorter than in *L. Ruficaudatus* or *Timidus*; and it is remarkable that the tail in the male is shorter than in the female—in both more so than in *Timidus*. The teats are six, two pectoral, and four ventral, just as in *L. Ruficaudatus*, and the skulls and teeth of the two species are framed upon precisely the same model, general and particular.—*Beng. As. Soc. Jour. No. CLXXIX. June, 1847.*

(969) *LEPUS PEGUENSIS*. Blyth, Is very similar to the *L. ruficaudatus*, Is. Geoffroy, of Bengal, Assam and an upper India, but at once distinguished by having the tail black above, as in the generality of the genus. Upper parts same colour as Bengal hare, but the belly abruptly white.

(970) *LEPUS RUFICAUDATUS*. Common all over Northern India.

(971) *LEPUS TYTLERI* seems the same hare as *T. ruficaudatus*.

(972) *LEPUS SINENSIS*? Captain Phayre,

## LINSEED.

imperfect skin of a Hare "from the east side of the range of mountains dividing Arakan from the valley of the Irawaddi, where the S. W. monsoon is much modified." It would appear to be identical with *Lepus sinensis*, Gray, of Hardwicke's 'Illustrations of Indian Zoology,' known only by that figure. The skull closely resembles that of *Lepus ruficaudatus*, Is. Geoff. (the common Bengal Hare; and so far as could be judged from what remained of the skin, the ears having been destroyed), the general structure would appear to be quite similar, but the colouring is remarkably different; being a mixture of deep tawny or rufo-fulvous with much black on the upper parts, and the under parts, whitish. The paws are black underneath, mingled with some tawny along the lower surface of the tarsus; the latter being almost pure white externally, and thus forming a remarkable and striking contrast with the hue of the lower surface. Tail black above and at the tip, whitish below towards its base. On the sides towards the belly the fur much resembles both in colour and texture that of the entire upper parts of *L. ruficaudatus*; but on the back the fulvous hue is very much deeper, and the admixture of black is much greater: the short soft underfur is deep buff or fulvous, whereas in *L. Ruficaudatus* the same is whitish or rather almost pure white.—*Beng. As. Soc. Jour. No. 4, of 1852, page 359.*

Hares are unknown in Arakan and in the Tenasserim provinces, also throughout the Malay-an peninsula and archipelago, with the exception of *Lepus Nigricollis*, F. Cuv. in Java, which has mostly probably been introduced from S. India or Ceylon, as it doubtless likewise has in the Mauritius; but we have met with several notices of Hares in the Hindo Chinese countries, even in Cochin China, the species being as yet undetermined.—*Beng. As. Soc. Jour.*

(973) LIENG-MAH, Burmese; Orange Tree.

(974) LIENG-MAH, Burmese; Lemon: (*Citrus lemonum*, &c.)

(975) LINSEED from *Facts for factories*, Bombay 1857. Four years ago (1853?) Bombay exported only 4,000 tons of seeds, whereas now (1857) it has reached 60,000 tons. Of these linseed forms about two-thirds.

### Price of seeds.

Linseed per cwt...	Rs. 5 to 6.
Rapeseed „ „ „ „ „ „	4½ to 5½.
Teelseed „ Candy of 5½ Cwt. „	20 to 27.
Copra (Stripped Coconut) Red	
per Candy of 5½ Cwt...	Rs. 54 to 60.
„ „ „ „ „ „	Black „ 55 to 60.

The loss in weight in cleaning linseed varies according to sample. On a good lot, the loss should not be over 5 per cent.



## LOMBOK.

usually about 4 per cent, in Kutch and Katty-war seed, it is very trifling.

On Khandeesh Teel seed, the loss is about 3 per cent.

Cleaning expenses come to about 2as. (3d) per cwt. but if done by machinery on a large scale, these should not exceed one anna (1½d) per cwt. and calculate another anna to cover weighing, carting &c.

In copra there is of course no loss in cleaning.

The red kind yields most oil, the black being used for food, is dearer.

Linseed has been known to cost less than four Rupees per cwt. and not very long since it was down to nearly that price and other seeds in proportion.

### Prices of oil in Bombay.

Cocoanut oil per maund of 28 lbs.	Rs. 3 10 0.
Castor " " " " "	2 15 0.
Gingelly oil (Sweet oil) " " " "	3 12 0.
Linseed " " " " "	3 0 0.

(976) *LOBIVANELLUS LEUCURUS*. This is found in India birds, the only Indian specimen previously recorded was obtained in Calcutta.

(977) *LOCUSTELLA RAYI*, Blyth, the British Grasshopper Warbler, would appear to be at Mhow not uncommon. A specimen has also been seen from the N. W. Himalaya.

(978) *LOLIUM ITALICUM*. Italian Rye Grass. Affords fine fodder for cattle: is a useful cold weather green crop, and is well worthy of extensive cultivation.

(979) *LOMBOK*. *The island of Lombok by K. Zollinger, Esquire.*

The princes of Mataram must be well acquainted with the number of the population of their island, since the manner of raising the taxes and regulating the military services, as well as the forced labour, obliges them to maintain a kind of census. The population of the island must amount to more than 400,000. I learnt this first from Mr. K., and afterwards from the Rajah himself, who at an audience asked, over how many persons Mr. Mayor had authority. When I answered over 500,000 the Rajah exclaimed in great surprise "that is then more than the population of my whole island." Finally, another chief informed me that the whole men capable of bearing arms amounted to 80,000 which multiplied by 5 gives 400,000 souls. If these data are correct, there are on Lombok exactly 4,000 persons on a square geographical mile. According to races and origin, the population of Lombok consists as follows:—

4 Europeans	5,000 Bugis.
1 European (coloured)	20,000 Balinese.
10 or 12 Chinese.	380,000 Sassaks.

One European lives at Piju, the rest at Ampanan. One Chinese is established as a trader, the rest are his servants, his coolies or those of the Europeans. The Bugis all reside upon the coasts

## LOTUS.

island. The population is divided amongst the different parts of the island as follows:—

north of the mountains,	40,000
in the mountains on the south	10,000
western half of the plain	220,000
eastern do.	135,000

This is an estimate made from the relative strength of population of those parts of Lombok visited personally. The data of the N. and of the S. were communicated.

The whole Balinese population reside at Mataram, and in the neighbouring parts, as at Ampanan, Karang, Assem &c. It is very prudent in the Balinese not to scatter themselves far in the country, because, in the event of an out-break they can be more easily collected together for defence than if they were settled in all parts of the island.

Small red fish (*iken mera*) are imported from Makassar.

Ivory, *Kayu pelet* and *Kayu Kamuning*, are imported by the Bugis from Sumatra and used for making the handles and sheaths of *Krises*, *Klewangs*, &c.

Exports to *Bima*, *Timor*, *Sumba*. Rice, *ding-ding*, oxen (very few).

Imports. Ponies (very few), fish, slaves (very few) sandal-wood (for China) tali ramie (thread of ramie) wax.

Of the government and the administration of the country it may be stated that the Rajah of Mataram is, by right of conquest, absolute sovereign of the island.

The Rajahs of Mataram are like their ancestors of Kawang, Assem and Beliling, members of the caste of Wasiyas. Although absolute monarchs, they consult nevertheless, of their own accord, in all important matters, the principal *gustis* and *idas* of the country, some of whom are entrusted with the execution of what is resolved upon. These men may be considered as the ministers of the Rajahs, if not *de jure et nomine*, at least *de facto*.—*Jour. Ind. Arch. Vol. V. No. 8, Aug. 1858.*

(980) *LOTUS*. The lotus is the most sacred flower among the Hindoos, it enters into all the ornaments of brass vessels used in the temples.

It is alluded to in the most popular poems, and the poets say, that the lotus was dyed by the blood of Siva, that flowed from the wound made by the arrow of Kama (Cupid)?

Yet marked I where the bolt of Cupid fell

It fell upon a little western flower—

Before, milk-white, now purple with Love's wound  
And maidens call it love-in-idleness.—

*Midsummer-Night's Dream. Act II.*

This flower is also considered an emblem of beauty; and in the *Retuavali*, or, the Neck-lace—a play written in the twelfth century, *Vasautaka* says to his lady love: My beloved *Sagarika*, thy countenance is as radiant as the

is the full-blown flower, and thy arms its graceful filaments.—*Wilson's Hindoo Theatre*, p. 296; *Chow Chow*, page 199.

(981) LUFFA. The Honorable W. Elliot sent two fruits of *Luffa Ægyptiaca*, grown in his garden, from seed brought by him from Egypt. This is one of the *Curcubitaceæ*. The Genus "Luffa" owes its name to the Arabic word for *Luffa Ægyptiaca*, viz. "louff" or "Loof," and is a remarkable kind of Gourd: when quite ripe, within, it has no pulp but is dry and filled with netted fibres, very much interwoven. It is used in Turkish baths as a scrubber. It is a useful product, and if cultivated would probably find ready sale.

*Luffa Ægyptiaca* is of easy culture, trained on a raised mound, similar to the snake gourd &c.—*M. E. J. R.*

### (982) LUFFA AMARA.

Hairy momordica, ENG.	Kereleh, PERS.
Luffe amere, FR.	Kerula, kurrella, INDIAN
Luffa bittere, GER.	and CASHM.
Kerula, BENG.	Sheti beera, TEL.

Every part of this plant is remarkably bitter,

the fruit is violently cathartic and emetic. The juice of the roasted young fruit is applied to the temples by the natives to cure headach. The ripe seeds either in infusion or substance are used by them to vomit and to purge—*Roxb.'s Fl. Ind. Vol. III*, p. 715.

(983) LUKUT, is at present the chief tin producing basin in the south of the Malayan Peninsula. It has a large population of Chinese, Malays and Binua, and its importance has induced the king of Salangor for some time to reside there. From Lukut, good Malay paths lead to the Langat on the one side, and Simujong on the other.—*Journ Ind. Arch. December 1850*. p. 754.

(984) LYLUT OOL QUDUR. *Arab.* The Night of power, occurs on the 27th night of the month Rumzan. Mahomedans sit up all night, burning frankincense-pastiles, repeating a particular prayer called "Nafil", reciting in praise of the Almighty, reading the Koran, and proclaiming the Azan. It is a period of great solemnity.—*Herkl.*

## M.

(985) MACAO. Sir John Davies states that it was about the middle of the 16th century that the Portuguese established themselves at this place. It seems that they had temporary shelter on shore.—*Davies, Chinese*.

(986) MACASSAR, from a few remarks made during the voyage of the *Himmaleh* in 1837, from the "Singapore Free Press" 1837, By the late G. Tradescant Lay, Esq.

The Macassar differs from the Bugis in having larger and more open features, as well as in the peculiar ruddiness that is mixed with the brown tincture of his skin. The hair is suffered to fall down and float loosely upon the shoulders, and has a red tinge oftentimes, by way of correspondence with the rest of the person. I have seen the truth of this circumstance questioned, because red hair and a dark complexion were thought incompatible with each other—an opinion that is not affected by this instance, for here the hair is not yellow nor orange, but its ends have a deep red hue, while the rest is black. The little boys and girls that you see running about in troops are often very handsome, while the lineaments of the latter are sometimes not only faultless in design, but they have withal a shade of thoughtfulness and melancholy, which is rightly esteemed to be the last touch and finishing stroke of personal beauty. These promises of future loveliness vanish before maturity, for the want, I suppose, of education, which, while it bestows un-

and perpetuate all the perfections of the body. I do not pretend to have a profound acquaintance with those branches of knowledge, that teach us to judge of the jewel by the shape of the casket; yet I cannot help thinking that the indications which I read upon the head and countenance of a Macassar, so often at variance with his present condition in the scale of morals and intellect, will hereafter unfold and explain themselves in a very delightful manner, when liberty and religion shall have cast their smiles upon him. That he is not deficient in head-piece is evinced by some productions of skill in the manufacture of gloves and baskets, where the workmanship for delicacy and fineness cannot be surpassed.

The first ascent of the barometer and the first descent of the thermometer in the afternoon is connected with a curious little fact in botany, the expansion of the flowers of the *Mirabilis jalapa*, which is for that reason here called the *Bunga Pakul Amput* or four o'clock plant. At 4 the barometer begins to rise, the thermometer to fall, the *Mirabilis* to open, as if by mutual understanding.

One of the prettiest plants I saw at Macassar was the *Damasonium indicum* or "telepo;" the petals are of delicate white, and the long calyx has its corners ornamented with a fringe gathered into a kind of flounce or furbelow. It is common in some of the floods



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the beauty of its figure than by the singularity of the leaves, which bear some distant resemblance to the way-side plantain of Great Britain. In the same waters we find a species of Mimosa, with large yellow flowers and very long floating stem, covered between the joints with a spongy substance. But notwithstanding the large supply of moisture that is laid up in the spongy receptacles just mentioned, existence out of the water is not to be tolerated for a moment, for as soon as you attempt to lift up one end of the stem the leaves begin to fold, the nearest first and then the more distant in succession. When the plant is restored to its native element, the leaves once folded from such an injury never revive and expand, teaching us that this sensibility is something beyond the ordinary range of mechanical causes. A French experimentalist found some nervous matter in the sensitive Mimosa; I think this would have yielded a copious supply for examination.

At Macassar the *Indro* or Gomuto palm is very common; at Bonthain it is replaced by the Lontar palm, which often presents itself as you ascend the hills in large clumps. It is known here by the Hindu name of *Tala*, and yields a juice that is very refreshing when obtained in a pure vessel. But it is customary to catch it in an old bambu tube, which sets the process of fermentation at work, so that it is seldom free from an acid and, to one not used to it, a very disagreeable taste. In this state it is much relished by the natives, who pass the tampurong or shell to each other as if they drank more to please their palate than to allay their thirst. The stem is remarkable for its straightness, bare in the upper parts, but often covered with a loose texture of sheathing below, which is characteristic of the tree.—*Journ. Ind. Arch. Vol. VI. No. 10.*

(987) MADU-KAH, the Tamil name of a tree, the wood of which is yellow and very small; its grain is close and heavy: it is not of much use or value.—*Edye M. and C.*

(988) MAHOMEDANS IN INDIA are divided into the four great classes, Syed, Sheikh, Moghul and Pathan.

The Sheikhs are of three origins, the *Koreishee*, Mahomed's tribe; the *Siddegee*, Abou Bukr's tribe; and the *Faroojee* or Oomer's tribe.

The *Syeds* are all descendants of Mahomed through his daughter Fatimah.

The *Moghuls* are of two countries, the Iranee or Persian and Tooranee or Turkish.

The *Pathans* are said to be descended from some of the Greeks who settled in Affghanistan.

These classes may be and are often, indifferently of the Shiah or Sunnee sect of Mahomedanism.

There are other smaller sects and classes, as the Nowaets, the Ghair-Mehdi, Ishmaelee, Lub-

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Mahomedanism comprises five divine commands,

1st.—Kulmah parhna, or confession of faith.

2d.—Numaz karna, or prayers.

3rd.—Roza rukhna, or fasting.

4th.—Zukat dayna, or alms-giving.

5th.—Mukkay ka huj karna, or pilgrimage to Mecca.

### *Mahomedan Saints of India.*

(989) *Abdool-qadir* surnamed Gows-ool-Azum the great contemplative, born at Jal, near Bagdad, A. H. 471 (A. D. 1078-79). He was endowed with great virtue and with the gift of miracles, had many disciples, and is still much revered. He is called Sheikh, but was a *Syed*, i. e. of the race of Hosein, and died in A. H. 571 (A. D. 1175), aged ninety-seven years. Where he died or was buried does not appear.

(990) *Sooltan Surwur*, at Balooch, four coss from Mooltan. He was distinguished for piety and purity of manners, and died as a martyr with his brother, fighting against a troop of idolators, and was buried with his wife (who died of grief) and his son, in the same tomb. Several miracles are related as having happened at his tomb. A camel's leg, when broken, was forthwith made whole; the blind, the leprous, the impotent were cured. (Araesh-e-Muhfil.)

(991) *Shah Shams ood Deen, Dariai*, at Depaldal in Lahore. He is stated to have had even a pious Hindoo among his disciples. The latter having expressed a wish to go and bathe in the Ganges, the saint directed him to shut his eyes, when lo! the Hindoo found himself among his relations and friends on that sacred stream, in which (as he supposed) he bathed with them. On opening his eyes again, he straightway found himself beside his spiritual guide in Lahore. His tomb is guarded by Hindoos, who will not resign their posts to the Moosulmans. It is also related that some carpenters having proceeded to cut down a tree which grew near his tomb, split it into many pieces for use. Suddenly a dreadful voice was heard; the earth shook, and the trunk of the tree arose of itself; the workmen fled terrified, and the tree did not fail to resume its flourishing condition.

(992) *Qootoob Sahib, or Qootoob ood Deen*, near Delhi. He lies buried at Qootoob, a town near Delhi named after him, in which the late Shah Alum and many members of the royal family of Delhi are buried. His tomb is much frequented by pilgrims, he being one of the most renowned and venerated of the Moosulman saints.

(993) *Sheikh Buha ood Deen, Zakaria*, Born at Cotcaror in Mooltan. He was a great traveller, having it is said, overrun Persia and Turkey, and a disciple for some time of Shihab ood Deen Sohurmurdee at Bagdad. He died on the 7th *Safur*, A. H. 665 (A. D. 7th September 1266).

(994) *Furreed ood-Deen*, Born at Ghanawal near Mooltan. He was so holy, that by his look clouds of earth were converted into lumps of sugar. He was therefore surnamed Shukur-gunj, which means in Persia the treasury of sugar.

(995) *Sheikh Shureef boo Ali Qulundur*, Born at Paniput, a town thirty coss north-west of Dehli, to which capital he came at forty years of age, and became a disciple of Qoottoob-ood-Deen. He devoted himself for twenty years to external sciences; after which he threw all his books into the Jumna, and began to travel for religious instruction. In Asia Minor he profited greatly by the society of Shams Tubreez and Mowluwee Room. He then returned home, lived retired and worked miracles, and is said to have died A. H. 724 (A.D. 1323-24.)

(996) *Shah Nizam ood Deen Owleea*, By some supposed to have been born at Gazna, A. H. 630 (A. D. 1622-3), and by others in A. H. 634 (A. D. 1236) at Badaam, a town in the province of Delhi where he lived. He died A. H. 725 (A. D. 1325); and was buried near Delhi, hard by the tomb of Qoottoob ood Deen. Through his great piety he was considered one of the most eminent saints of Hindoostan.

(997) *Kubeer*. A celebrated Hindoo Unitarian, equally revered by Hindoos and Moosulmans, founder of the sect called Kubeer Punthee or Nanuk Punthee, from which Nanuk, founder of the Sikhs, borrowed the religious notions which he propagated with the greatest success.

(998) *Baba Lal*. A Durvesh (and likewise a Hindoo) who dwelt at Dhianpoor in the province of Lahore, the founder of a sect called Baba Laees. He held frequent conversations on the subject of religion with Dara Shikoh, eldest son of Shah Juhan, and brother of Aurungzebe, which have been published in a Persian work by Chundurbhan Shah Juhanee.

(999) *Shah Dola*, Died in the seventeenth year of the reign of Alumgeer, at first a slave of Kumayandar Siolkoti in Lahore. But he seems afterwards to have attained great affluence as well as fame; for having settled at Ch'hottee Goojrat (little Guzerat), he built tanks, dug wells, founded mosques, and bridges, and embellished the city. And no wonder; for though his contemporaries came to visit him from far and near, and made him presents of gold, money, and other objects, he returned to each three or four-fold more than he received. His generosity was such, that had he been contemporary with Hatim Tai, no one would have mentioned the name of that hero.

(1000) *Syed Shah Zoohoor*, Distinguished by his wisdom, piety, and austerity of life. He built a small monastery of earth at Allahabad, which still remains. He was celebrated for his miracles, and by his prayers the most frightful

of which an instance is given in respect to the case of the governor of Allahabad, Nuwab Oomdut ool Moolk Ameer Khan. This saint (Zoohoor) boasted of having lived three hundred years.

(1001) *Sheikh Mohummud Ali Hazin Gillanee*. His tomb is at Buxar, where he died in A. H. 1180 (A.D. 1766-7), distinguished for his science, learning, and literary talents. He wrote in both prose and verse with equal skill.—*Herkl. p. 432.*

(1002) MAILAH, the Tamil name of a tree which grows to about twelve feet high, and twelve inches in diameter. It is generally curved, and is used in boat work. It produces a fruit which the wild pea-fowl feed on; and is to be found in the forests of Malabar, and also in Ceylon.—*Edye, M. and C.*

(1003) MALABAR POINT, BOMBAY. Here are the ruins of a very ancient black stone temple, and many fragments strewn about with a variety of images sculptured on them. Below the point among the rocks, there is a cleft well known to the natives, and esteemed very sacred.—*Chow Chow, page 60 and 61.*

It is here we believe, where the believing hindu, obtains regeneration or a second birth: He comes to the spot and deposits all his clothing, then passing through the aperture he is supposed to be born again, and ablution in the tank and gifts to the priests completes the washing away of his sins.

(1004) MALABAR COAST. Along this coast, cocoanut day, is one of the great feasts at every seaport town. It occurs in August, and is supposed to mark the termination of the rainy season, the date when the navigation of the sea is open, and when the Hindoo trader may very safely trust his ships and goods to the ocean. At Bombay, the natives clad in their holiday attire, go in procession from their houses in the town to the seashore, preceded by bands of music. On the beach, numerous ceremonies are performed over a cocoanut, generally covered with gold and silver leaf, which is then cast into the sea as an offering by the principal person present. Every trader or boat-owner there makes a similar offering on his own account. Many of the lower classes of natives swim or wade in, to fish out the cocoanuts; and as during the scramble, some of them often receive severe knocks from the cocoanuts, which are thrown in by persons in the crowd, there is generally a good deal of laughter, noise and excitement.

'The first boat of the season' generally puts to sea directly after, gaily decorated with streamers. In former days, the chief civil functionary at the Company's factories, at such places as Tanna, Surat, and Broach, used to attend and sometimes cast in the first cocoanut; but this practice has been long since stopped by orders from the Court of Directors, and no servant of Government is now allowed to take any part in any such



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(1005) MALAY PENINSULA. The Malay Peninsula, if we give the term its widest application, is disengaged by the Gulf of Siam from the broad mass of the general Hindu Chinese Peninsula in about  $13^{\circ}30'$  N. L. Its length is so great compared with its breadth, being nearly as 10 to 1, that it may be described as an irregular zone stretching from that latitude (Lon.  $98^{\circ}$  . .  $100^{\circ}20'$  E.) through above 800 miles (Geo.) to within  $1^{\circ}14'$  of the Equator (Lon.  $104^{\circ}27'$  . .  $104^{\circ}17'$  E.) and dividing the sea of Bengal from that of China in their southern portions. Its base is a line extending from a point a little southwest of Bangkok to the mouth of the Tavoy river, at right angles to the direction of its northern half. Thence it stretches almost due southward for about  $5\frac{1}{2}$  degrees between the Bay of Bengal and the Gulf of Siam, at first gradually contracting its breadth from above  $2^{\circ}$ , that of the base, to  $1\frac{1}{2}^{\circ}$  in  $12^{\circ}$  N. L., where the eastern coast suddenly retires at Kwi Point for about 40 miles, thereby reducing the breadth to about  $1^{\circ}$ , which it retains with little variation to the latitude of  $9^{\circ}$ . Here it again abruptly expands on the east into the Gulf of Siam, this expansion coinciding with the commencement of the second or southern half of the Peninsula, which is very decidedly distinguished from the northern by a difference in form and direction. It is to this latter half that the name of the Malay Peninsula should perhaps be restricted, as it indeed seems often to be by writers. The northern half is properly a long isthmus, that of Kira, connecting the Peninsular Malaya, (as it is sometimes called,) with the Hindu Chinese region.

A slight deviation of  $2^{\circ}$  E. from this direction (or  $140^{\circ}$  of the circle) will give the sides of a parallelogram 82 geographical miles in breadth, extending 540 miles throughout its whole length, and including the maximum of land that can be embraced by a regular figure of four sides, or 44280 square miles. Nothing can better show the essential regularity of the Peninsular form, and the correctness of the direction indicated, than the fact that the bulging portions on the east and west sides are themselves very elongated, no where of greater breadth than 50 miles, while generally much less, and altogether occupy about 17,280 square miles. The surface of the Peninsula is thus about 61,560 square miles.

If to this the Isthmus, which has a superficies of about 21,600 miles, be added, the entire area of the Malay Peninsula, in its widest sense, will be about 83,000 square geographical miles.

The western coast of the Peninsula is remarkable for the great number of islets of various sizes which skirt it. A broad and almost uninterrupted belt of these extends along all the western side of the Isthmus, and is continued as far

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the Lankawi group contains only a few. The rest of the western coast and the greater part of the eastern are more thinly sprinkled with islands. But there are several extensive groups of islands, some of them remarkably bold and imposing, along the latter coast, such as the eastern Johore Archipelago, and the Redang islands. The concave southern coast half embraces the islands of Singapore, and an Archipelago of several hundreds of islets stretching to the S. E. by S., from the termination of the continent to Banka and Billiton, marks that the peninsular zone has not yet wholly sunk beneath the sea, and, expanding as it does to the west and blocking the extremity of the Straits, attests how nearly a junction with Sumatra has been accomplished.

Most of the bays, coves and creeks have been subsequently filled up by sediment, producing flat plains and mangrove swamps, through each of which wind the waters from the surrounding hills, collected in streams. The most advancing hill ranges are often seen extending like ribs across the flats, and projecting at the coast or around the margins of the plains.

The western coast of the isthmus is hilly, much and deeply indented, and acquires a peculiar character from the broad and continuous zone of islands, known as the Mergui Archipelago, to which we have already alluded. Most of the islands are bold, and one of them, St. Matthew, rises to the height of 3,000 feet. The isthmus itself is occupied by numerous high hill ranges, which have the same general southerly direction. Along the sea borders considerable tracts of flat alluvial land occur, the best known of which is the large plain of Tenasserim.

From Junk-Ceylon to the Langkawi group, the coasts of the mainland and islands, still exposed to the full force of the Bengal sea, are broken, and frequently rocky and precipitous. The high and perpendicular limestone rocks, with their deep excavations pillared with colossal stalactites, and with their summits crowned with dense forest, present the most magnificent scenery. As we proceed south the coast changes, the islands disappear, and on the mainland a broad wooded plain extends from the beach to a considerable distance inland, where mountains are seen stretching away to the southward. The island of Pinang is a bold mountain mass, rising in some of its northerly summits, to a height of nearly 3,000 feet, and contrasting nobly with the broad and beautiful plain which lies opposite to it on the mainland.—Page 87.

It is impossible to form any estimate of the average height of the interior. The only mountain whose height has been accurately measured is that of Pinang. The summits, of which heights have been most carefully ascertained; are respectively 2,922 and 2,410 (Belcher) feet above

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Peak) and Gunong Ledang (Mount Ophir) have been stated to be 5,705 feet (Low) and 5,693 feet (Newbold,) high, but no dependence can be placed on estimates which have not the foundation of even the rudest barometrical or trigonometrical observations, and which are probably considerably too high.—*Page 89.*

In the geological formation of those countries, the Malay Peninsula forms an important link in the chain of evidence. It is directly united not only geographically but geologically with the continental mass, and, through the islands to the south and Sumatra on the west, a connection with the rest of the Malayan Archipelago can be established.—*Page 90.*

The mountain zone of Sumatra, while it is parallel to the Peninsula, and repeats its plutonic rocks, is at the same time, almost united to Java, and, throughout its whole length, contains tracts of volcanic rocks, and volcanoes, several of which are still active.

The volcanic belt of Sumatra extends at least to Chittagong, thus following the plutonic bands of the Hindu Chinese region through a large part of their course to the north.—*Page 91.*

Indications of coal have been found on the coast to the south of Junk-Ceylon, and a partial examination on different occasions during the year resulted in the discovery of coal at Tama, Tangong Bongbong and T. Patong, of which the most northerly is in lat. 8° N. and the most southerly in 7° 37' N. (Journ. Ind. Arch &c. vol. I. p.p. 145, 151, 353.) Traces were also observed about one degree farther south. It has not yet been found in layers sufficiently thick and pure to be wrought, being generally lapidified or pyritous. But, where pure, it is a highly bituminous jet, and superior to the products of the Indian coal fields. The existence of coal in the calcareous division of the Peninsula serves to shew that its geological features were analogous to, or identical with, those of the isthmus of Kra, before the era of the plutonic elevation of the zone.

We believe that the limestone has not been observed further south in the Peninsula than the Bunting Islands, which lie a few leagues to the north of Pinang. Opposite Pinang, and for some distance to the northward, sandstone appears to be the principal aqueous rock. It is associated with clays and shales. A similar formation probably existed and is still partially preserved, in Perak, but we have no account of the sedimentary rocks of that country, nor of the northern part of the next kingdom, Salangor. Of the southern part of Salangor and of Johore generally we can speak more positively from personal observations. The predominating sedimentary rocks in the last two degrees of the Peninsula are argillo micaceous and argillaceous

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ciated. The sandstones and common clays and shales, in some places predominate, as in Singapore, and some of the middle parts of Johore. The same rocks are found in the northern islands of the Johore Archipelago, but we are without any actual observations of the large portion of this Archipelago. In Banka the prevailing stratified rocks are clays and sandstones.

*Metals.*—The tendency to the production of metalliferous ores at and near the junction of plutonic and sedimentary rocks which has been observed in many countries, might have led us to anticipate a large share of metallic riches for the Peninsula. In reality it probably abounds in some ores far beyond conception.

Iron ores are every where found, and in the south they exist in vast profusion. In some places the strata have been completely saturated with iron, and here the bare surface of the ground, strewed with blackish scoriform gravel and blocks, presents a strange contrast to the exuberant vegetation of surrounding tracts, appearing as if it had been burned and blasted by subterranean fires. Much of the ordinary forms of ironmasked rocks, which are so common and so little regarded for their metallic contents that in Singapore they are used to macadamize the roads, contain often nearly 60 per cent. of pure metal.

The whole length and breadth of the Peninsula, there can be little doubt, abounds in tin ore. The uniformity, we might almost say unity, of its plutonic character, warrants the inference that ores found plentifully in many different and distant localities where they have been sought for, exist also in the intermediate tracts which have not yet been examined. At the two extremities of the Peninsular zone of elevation, Junk Ceylon and Banka, tin sand is diffused in such quantity that its collection has never had any other limit than the number of persons employed in it. In Junk-Ceylon and Phunga under a barbarous government, about 13,000 piculs are annually dug out of the soil. In Banka, under a European government, but without any improvement on the usual Chinese modes of excavating, washing and smelting, the production has increased from 25,000 piculs in 1812 when it was a British possession, to 60,000 piculs.—*Dr. Epp, Schilderingen aus Ostindiens Archipelago, p. 83.*

At numerous intermediate localities throughout the Peninsula tin is obtained; and when we consider the despotic, rapacious and too often remorseless character of the native governments, the consequent failure of all attempts to introduce European or Chinese capital and system into the tin mining, and the robberies and massacres which from time to time terrify and scatter the little communities of needy Chinese in these hands it has remained, the wonder is that



ket. In the Siamese countries north of Kedah and in Kedah itself which has been so long in a state of anarchy, it is sparingly extracted. From Perak 9,000 piculs per annum were formerly exported, but the produce has now greatly diminished owing to the miserable state of the country. Salangor and adjacent inland states yield about 9000 piculs. The eastern countries from Kalantan to Pahang yield about 11,000 piculs. The present produce of the whole Peninsula including Sinkep and Linga, the only two islands of the Johore Archipelago where it is now sought for, is probably above 40,000 piculs. The produce for many years past has ranged between that quantity and 30,000, the Peninsular range, therefore, including Banka, yields upwards of 100,000 piculs, so that it equals or exceeds that of Cornwall (6,000 tons) and may be expected to increase steadily.

Seeing that tin is procured in all parts of the Peninsula where it is sought for, and in proportion to the enterprise and labour which are devoted to the search, we may consider the entire zone as a great magazine of tin. It is, in fact, incomparably the greatest on the globe. Johore might have seemed to offer an exception to the apparent universality of the distribution of oxide of tin, if its geological affinity to Banka, the fact of tin having from time to time been found in several places, and for many years having been got in considerable quantity in Malacca, had not afforded the strongest presumption that its want of inhabitants and government was the cause of its non-productiveness. The last eighteen months however have placed the matter beyond doubt, and given a striking proof at once of the metallic fertility of the country, and of the little attention which this branch of industry has hitherto met with in the British Settlements. In 1845 Malacca, an integral part of Johore and having the same geology as the rest of the country, produced about 450 piculs of tin. In the succeeding year the interest of some Chinese of capital was excited in the subject, and more vigorous and extensive operations were commenced. In 1846 above 1,400 piculs were procured, the greater part from 39 pits in one valley. In 1847 the produce appears to have been from 4,000 to 5,000 piculs. In 1848 it will probably rise to between 5,000 and 7,000 piculs, for the government title upon it for the year has been rented for the unprecedented sum of 8,190 Sp. Dollars, the revenue from this source having been in the two preceding years Sp. 1,020 and Sp. 3,345 respectively.

Nothing can better shew how entirely the metalliferous character of the Peninsula has escaped the mining enterprise of private European capitalists than the fact that in the island of Singapore, where we have a line of junction between plutonic and sedimentary rocks of above twenty

miles in length, where tin was found in former years in at least two localities, and where the same iron ore with which it is associated in Banka abounds both in the igneous and aqueous rocks, no interest has ever been awakened in the subject.

In the Peninsula and Banka, tin has hitherto been procured by digging pits in alluvial tracts where the ore is found, generally intermixed with quartz particles, in a state resembling sand varying from fine to coarse. In most cases it appears to be properly stream ore i. e. the fragments and particles of disintegrated rock that have been borne to lower levels by rain torrents and streams. We think however that there are both tin and gold pits in which the rock has been decomposed and disintegrated in situ, and a careful examination would probably prove that there are many such. The clays in our Peninsular vallies are not always alluvial, and in the higher part appear most often to mark the decomposition of the subjacent rock. In a recent excellent geological work by Professor Ansted (*Geology, Introductory, Descriptive and Practical*, vol. II. p. 281.) it is erroneously stated that in Banka the ores of tin are entirely obtained by sifting the gravel and sand of rivers. In Banka and the Peninsula the beds of streams are seldom restored to, save to obtain indications of the probable abundance of "tin sand" in the vicinity. One of the narrow vallies between the parallel ranges or branches of the low hills is selected, and, if tin be found, pits from 10 to 60 feet in depth are dug, and carried regularly up the valley, a new one being opened as soon as the last is exhausted. In this way the entire breadth of a valley is sometimes excavated by successive pits throughout a length of two or three miles, if the tin sand be found continuous.

In Malacca the tin sand is generally found at the bottom of a series of alluvial layers. This is also the case in Cornwall, where it appears to be attributed to diluvial action. In the Malacca vallies there is no evidence of diluvial action. The accumulation of the tin ore in the bottom of the valley may be explained, in some cases, by the decomposition of the rock and washing away of the clayey and lighter siliceous particles, the tin ore and associated quartz remaining by their gravity. In other cases it may probably be explained by the consideration that in the earliest ages of the vallies the disintegration must have been more rapid and the fall of the vallies greater. The torrents in rains would have a considerable impetus, and carry forward the disintegrated fragments of the rugged and naked ravines. In the course of time these would be smoothed into gentle slopes covered with vegetation, and the slopes of the bottoms of the vallies would gradually decrease as their mouth became choked with mud flats and sand banks, and the alluvial deposit spread back, raising the level of the vallies.

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We have dwelt at some length on tin because it is the principal natural production of the Peninsula, which derives importance economically from the fact of its being the greatest stanniferous tract in the world and which has never been sufficiently appreciated. We are able to state confidently that the geological conditions which seem to be necessary for the production of tin in this part of the world are found in the Peninsula as fully developed as in Banka. Both portions of the zone have been equally affected by, and have indeed originated in, one and the same igneous action, of which one of the phenomena has been the formation of tin ore. The existence of tin in Banka was unknown until 1709 when it was accidentally discovered. Now, its produce doubles that of the Peninsula, although the latter has a surface 18 times larger. The reason is not a mineralogical one. It is because in Banka the Chinese are stimulated, furthered and protected by a strong Government, which directly interests itself in their operations.

We have large specimens with ore adhering to and partially invested with quartz. We are not aware that it has ever been actually seen in the solid rock in the Peninsula, but in Banka it is found associated with iron ore in veins in the granite. A Dutch writer also describes whole layers as occurring in some mountains which consist partly of granite, but in the centre principally of layers of sandstone and quartz in which iron ore also appears. In the more purely granite mountains it seems to have been observed in quartz at the junction of the granite with the iron veined sandstone strata. In the Isthmus of Kra it has also been found at the junction of sandstone and granite. In Cornwall it appears to be dependent on granite. "Granite or its modification elvan, occurs near, or at all the localities where tin and copper ores so abound as to be worked and produce good mines."—*De la Beche*.

The finest one of Banka yields as much as 80 per cent of metal, the common sorts from 40 to 60. The quality of Peninsular ores has not been ascertained so carefully. We are not aware that more than 70 per cent has ever been obtained.

Gold is found in the Peninsula, but, whether from inferiority of enterprise or natural deficiency, not in such abundance as in those parts of the adjacent countries of Sumatra and Borneo where it is systematically dug for. The present annual produce is probably about 20,000 ounces. In all the larger specimens which we possess or have seen it is disseminated in small particles, and streaks in quartz. Like the tin ore it has not been seen in the undisintegrated rock.

Copper, silver and arsenic have been detected in Banka, but apparently in small quantities.

*Climate*.—The mean temperature of the Peninsula is probably about 80° at the level of the

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sea. In its general humidity it also approaches to uniformity, but dry and rainy weather are more distinctly separated in the northern countries than in the southern. The latter are not subject to the occasional violent rains and prolonged droughts which visit the former, and the former are not exposed to the frequent tracts of damp, foggy, rainy weather which are experienced in the latter.

During the N. E. monsoon, which ordinarily blows from November to March, the weather is generally settled in the Straits of Malacca, and N. and N. E. winds, prevail, particularly on the coast of the Peninsula, but are not of great strength save towards the northern end of the Straits. Breezes usually blow from the Peninsular shore at night. The equable character of this season is attributable to the monsoon being broken by the mountains of the Peninsula, which stretch transversely to its direction.

The S. W. monsoon, which prevails from April to October, blows against the northern part of the west coast of the Peninsula, which consequently, in some measure, participates in the rainy climate which characterises the eastern shore of the Bay of Bengal during this monsoon. Further south, it is broken by the mountain belt of Sumatra, so that, in the Straits, land and sea breezes generally prevail in the vicinity of the coasts, and an equable climate is experienced. The Sumatra sides of the Straits, and the southern portion of the Peninsula, at night are exposed to occasional sudden squalls from the S. W. accompanied by lightning and heavy rains, called Sumatrans. Northwesters are also experienced, but more rarely. They occur chiefly in the northern part of the Straits as far as the Arroas, but sometimes blow right through them to the Carimons. During this monsoon the east coast of the Peninsula, having a leeward exposure, and being, for the greater part of its length, protected by the double wall of the Sumatran and Peninsular ranges, is perfectly sheltered, and dry weather prevails.—*Journ. of the Indi. Archipelago*, Vol. II, February, 1848.

*Ethnology*.—The annals of several ancient Malay states point to Palémbang as the original land of the Malays. They afford various indications of a close connection between it and Java, and mention Java invasions and settlements long anterior to the modern conquest of Palémbang by Majaphit. From their concurrent tenor, it appears that the royal dynasties of Menangkabau, Malacca and other states, traced their descent from Palémbang. It may be inferred that it was in Palémbang that the Malay race and language received their earliest and deepest impressions from Hindu and Javan influences and that the Indian monarchical form of Government was first engrafted on the Native Sumatran institutions, which are of a mixed patriarchal and oligarchical form. It is even probable that Palémbang



was closely connected with the Southern extremity of the Peninsula long before the foundation of the modern colony of Singapore. The remnant of the ancient vocabulary of Johore small as it is, contains some words only found elsewhere in Upper Palembang and others of Sundan and Javan affinity, which may also have been immediately observed through Palembang.

In an account of the wild tribes inhabiting the Malayan Peninsula, Sumatra and a few neighbouring Islands, by the Rev. P. Faver, Apostolic Missionary, Malacca, these wild tribes are divided into three principal classes, which are subdivided into many others. The first of these divisions includes the Battas, who are said to inhabit the interior of Sumatra and a few neighbouring islands. The second is that of the Semangs, who are found in the forests of Kedah, Tringanu, Perak and Salangor. Under the third head are comprised many tribes, known under the ordinary term of Jakuns, which inhabit the south part of the Peninsula from about Salangor on the west coast and Kemaman on the east, and extending nearly as far as Singapore. All these various wild tribes are ordinarily classed under the general and expressive appellations of Orang Binua, which signifies, men of the soil; this will be the expression I will use when speaking of these tribes generally and without intending to refer to any one in particular.—*Journ. of the Ind. Arch. Vol. II. No. 5. May, 1848, page 237, et sequent.*

*Binuas.*—Among the Binuas whom I have interrogated on the matter, many answered that the Malays were descendants in great part from them, who were, without any doubt, the first inhabitants of the land.—*Page, 238.*

*Jakuns of Johore.* This is a fine race of men many of them are taller than those of Malacca, their face is expressive and well characterized and the expression of the eyes in many of them is a little serene.

It is stated by the Binuas, and admitted by the Malays, that before the Malay Peninsula had the name of Malacca, it was inhabited by the Binuas. In course of time, the early Arab trading vessels brought over priests from Arabia, who made a number of converts to Islam: those of the Binuas that declined to abjure the customs of their forefathers, in consequence of the persecutions to which they were exposed, fled to the fastnesses of the interior, where they have since continued in a savage state.

I am therefore inclined to be of the opinion which Lieut. Newbold appears to embrace, and I am induced the more readily to believe that the Binuas, and chiefly the Battas of Sumatra and the Semangs of the north of the Peninsula are the savage people whom Herodotus has spoken of, as inhabitants of the eastern countries of India, producing gold; and I dare say with the same author, that it is scarcely possible that the father of history intended to speak

of any other Indian people; for he would have spoken of such clearly and fluently; since all the other parts of India to the Archipelago were very well known to that historian, whilst he on the contrary speaks of the tribes he describes, only in rather an obscure style, and as "having received an account of them from some adventurous traders who having sailed from the shores of the Red Sea or the banks of the Euphrates, coasting the shore of India to the Archipelago: and who returned to their native lands laden with the gold dust, ivory and spices of the east."

The Jakuns of Johore, are a fine race of men; many of them are taller than those of Malacca; the face also expressive and well characterized, and the expression of the eyes in many of them is a little severe; I have already observed that their nose does not recede at the upper part, neither is it so flat or so broad at its base, as this feature in the Chinese, Cochin Chinese and pure Malay. A thing in which the Jakuns (only those of the Menangkabau States) are truly skilled, is the art of using the Sumpitan and poisoned arrows; as I will have occasion to mention when speaking of their weapons. When the durian season is come, a good number of Jakun families leave their house, men, women and children repairing to places where durian trees are found. They then again clean the ground in order to find more easily the fruit, which falls when ripe, and, dwelling in the small houses of leaves, prepare themselves to enjoy the treat which nature presents to them. For six weeks or two months they eat nothing but durians. When the season is over, the place is abandoned until the next year. One of their most prized dishes is a honey-comb, and let it be said with due respect to the opinion of our European cooks, the time when the honey is in the comb is not, amongst these epicures of nature, considered the proper moment to take the hive; but they wait until the small bees are well formed in the cells, and a few days before they are ready to fly away the honey comb is taken with great care, and, wrapped up in a plantain leaf, is put upon the fire for a few minutes, and then wax, and animals are devoured together, and considered as an uncommon treat. The Jakuns chew betel leaf together with the areca-nut and gambier, but for the want of the betel leaf, they use the leaf of a tree called Kassi. Tobacco, when it can be had, is much used, even by women and children, in chewing and smoking. The Jakuns of Malacca, and those of Johore have no other arms than spears and parangs; very few use the sumpitan, and they are entirely unacquainted with the use of poisoned arrows.—Vol. I. p. 272. The Jakun's spears consist of an iron blade of about one foot long and one inch broad in the middle, attached to a thick rudely worked shaft about five or six feet long, and sharp at the inferior extremity, in

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order to enter easily into the ground ; for before they enter a house they strike the end of the spear into the ground, where it remains until they go away. This is also the custom of the Johore Binua. It is scarcely possible to meet a single Jakun without his spear, which is both a stick to walk with, and an offensive or defensive weapon as the occasion requires. The parang is an iron blade of about one foot long, and two or three inches broad with a haft like that of a large knife ; they use it to cut trees employed in the building of their houses ; and to cut branches to open a passage when journeying in the thick jungle : it is also used as a defensive weapon against wild beasts. I know a Jakun who being attacked by a tiger, defended himself with a parang (the only weapon he had with him at the time). Nearly half an hour was spent in this singular combat : the Jakun lost an eye and was seriously wounded in the head ; but the royal beast paid the forfeit with his life. The Jakuns of the Menangkabau States use the parang, the sumpitan with poisoned arrows, and a few of them the spear. The sumpitan is a small bamboo of the size of the index finger, from six to ten feet long with a head as large as a fowl's egg, this piece of bamboo is inserted until the head fits into a larger one of the same length. The arrows are very slight slips of wood the thickness of a knitting-needle, and from eight to ten inches long terminating in a fine point, coated with poison for the space of an inch or so ; at the other extremity of the arrows, is placed a cone of white wood, cut in such a way that it may just fill the tube of the sumpitan to receive all the impulse of the air, and this cone also aids in directing the arrow ; this is propelled by collecting air in the lungs, and strongly emitting it into the head of the sumpitan partly inserted into the mouth of the projector. The range, to take proper effect, is about seventy or eighty feet ; some can reach one hundred and forty or fifty feet ; but then there will be little chance of being dangerously wounded. The timiang or sumpitan used by the Mintira and other Burman tribes is described in *Journal Ind. Arch.* Vol. I. p. 272. A principal defect of the weapon is that, from the excessive lightness of the darts or arrows, a puff of wind affects their direction.

There is a tradition on the origin of some tribes of Jakuns, called Orang Laut, (men of the sea) because they live ordinarily in boats upon the sea on the shore. It is related in the following way by Newbold Vol. II. p. 4. II.

"Dattu Klambu, a man of power in former days, employed a number of Jakuns in the building of a palace. He had an only daughter, who, once upon a time observing the primitive costume of some of her father's workmen, was seized with an uncontrollable fit of merriment. Whereupon, the irritated Jakuns commenced

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the incantation "chinderweye," and pursued their way to the forest, followed by the spell bound princess. Dattu Klambu despatched messengers to bring back his daughter, but she refused to return, and eventually became the spouse of one of the Jakun chiefs. Dattu Klambu, on receiving intelligence of this occurrence, dissembled his resentment, and invited the whole tribe to a sumptuous entertainment, on pretence of celebrating the nuptials. In the midst of the feast he fired the palace, in which the revels were carried on, and the whole of Jakuns except a man and woman perished in the flames. These two Jakuns fled to the sea-shore, and from them sprang the Orang Laut, who, not daring to return into the interior, have ever since confined themselves to the coasts and islets."

This tradition related by Jakuns is entirely different from another entertained by the Orang Laut themselves on the same subject, for, they say, that their first parents were a white alligator and a porpoise. *Ib.* p. 422.—*The Journ. of the Indi. Arch.* Vol. II. No. 5, May 1848, page 272.

(1006) MALAY AMOKS. We insert the following remarks, extracted from an official Medical Report on Singapore by Dr. Oxley. They are of very great practical value. The importance of the diffusion of correct views respecting it cannot be overrated.

The character of the unsophisticated Malay is remarkable for its simplicity and honesty ; having no artificial wants they are satisfied and content with what would be considered positive destitution by a Chinese, they are consequently apathetic and inactive, and will not for any amount offered to them, labour beyond their usual habits, or customary routine ; they have little of any speculative turn ; they have a regard for truth and may generally be depended upon in their statements. What has so often been written of their revengeful spirit is much exaggerated, polite in the extreme according to their own ideas, they never indulge in abuse one towards the other, the only reply to any deviation from this rule is the Kriss, for which they will watch their opportunity and most certainly not afford their adversary any advantage it is in their power to deprive him of. This is their code of honor, and being fully aware of it amongst themselves, provocation is seldom given, and satisfaction as seldom required. When goaded however to the necessity, they become perfectly reckless, and should discovery attend the deed they attempt no refutation but sell their lives at the utmost cost they can to the captors. Too often have I known the officers of Police compelled to shoot them on these occasions. Such is one species of "Amok," and how offenders of this description are to be dealt with, can admit of but little doubt, but there is another variety of the "Orang Beramok" vastly different, and by no means the least frequent,



which requires discrimination on the part of the Medical Jurist, to prevent irresponsible persons suffering the penalty of the injured Law. For instance a man sitting quietly amongst his friends and relatives will, without provocation, suddenly start up weapon in hand and slay all within his reach. I have known so many as eight killed and wounded by a very feeble individual in this manner. Next day when interrogated whether he was not sorry for the act he had committed, no one could be more contrite; when asked why then did you do it, the answer has invariably been "the Devil entered into me, my eyes were darkened, I did not know what I was about." I have received this same reply on at least twenty different occasions; on examination of these monomaniacs, I have generally found them labouring under some gastric disease, or troublesome ulcer, and these fearful ebullitions break out upon some exacerbation of the disorder. Those about them have generally told me that they appeared moping and melancholy a few days before the outbreak. It is certainly much to be deplored that monomania amongst the Malays, almost invariable takes this terrible form. The Bugis, whether from revenge or disease, are by far the most addicted to the "Amok" I should think  $\frac{3}{4}$ th of all the cases I have seen have been by persons of this nation.—*Journ. of the Indian Archipelago*, Vol. III, No. 8, August 1849, page from 532 to 533.

(1007) MAMMALIA of Arabia, Abyssinia, Egypt.—*From the Jour. Asiatic Society Bengal*, No. CCXLVIII, No. III, 1855.

(1008) *Cercopithecus enyithia*, (Herm. apud Gray; *C. griseo-viridis*, Desm.; &c.) Abyssinia.

(1009) *Canis variegatus*, Ruppell. Abyssinia.

(1010) *Sciurus multicolor*, Ruppell (*Sc. cepate*, A. Smith). Abyssinia.

(1011) *Xerus setosus*, (Forster; *Macroxus Cuco-nubrius*, Ruppell; &c.) Abyssinia.

(1012) *Psammomys obesus*, Ruppell; Egypt.

(1013) *Potamocheilus africanus*, (Schreber; *Sus*.

(1014) MAMMALIA of Ceylon by E. Blyth, Esq.—*Beng. As. Soc. Journ.* No. 2 of 1851, p. 153 to 185.

(1015) *Quadrumana*. Of five species (or very distinct races) of Monkey in Ceylon, one only is known to inhabit the neighbouring mainland, this is

(1016) *Presbytis Pariamus*, Elliot, Blyth. The small crested *Hinuman* of peninsular India, which is common in the Jaffna peninsula at the extreme north of the island, and probably to some distance farther south: but generally over the low northern half of Ceylon, we have in its place,

(1017) *Pr. Thersites*, Elliot, Blyth, a very similar race but nearly as large and powerful as *Pr. Entellus* of Bengal, and which is further distinguished from *Pr. Priamus* by having no abruptly rising compressed vertical crest, nor the radiating centre of hairs a little behind the brow seen

in the various other enteloid Monkeys. Its white beard and whiskers are also more conspicuously developed, and contrast strongly with the black face and dark body. According to Dr. Kelaart, they are respectively known as the *Maha* or ('great') Wanderoo, and the *Sadoo* (or 'white') Wanderoo. The *Pr. Cephalopterus* he indicates as the *Kaloo* (or 'black') Wanderoo, and the *Macacus sinicus* as the *Rilawa* of the Cinghalese.

Here it may be repeated that the name Wanderoo, as applied to *Pr. Cephalopterus* in particular, has been transferred by most writers to a widely different monkey of merely somewhat similar colourings,—the *Macacus sinicus*, which inhabits Travancore and Cochin, but has not been observed wild in Ceylon.

Mr. Layard states that *Pr. Cephalopterus* is "the common black monkey of the maritime provinces, very common also in the Kandyan districts. About Trincomali it is replaced by *Pr. Thersites*, and in the Jaffna peninsula by *Pr. Priamus*, which last is particularly abundant about Point Pedro." According to a letter since received from Dr. Kelaart, *Pr. Priamus* would seem also to inhabit the hilly country about Kandy. Dr. Kelaart, however, presented the Bengal Society with a fine adult male of the mountain or Kandyan representative of *Pr. Cephalopterus* from Newera Elia; and it is quite as different from the small animal of the coast as *Pr. Thersites* is from *Pr. Priamus*. General aspect the same but considerably larger and more powerful, with a much longer and very full coat, the piles on the sides measuring 4 to 5 in. long; In this it resembles the other mountain species of the genus, as the Himalayan Lungur, *Pr. Schistaceus*, Hodgson, a very strongly marked race (for habits of which vide J. A. S. XIII, 472,) and in a less degree *Pr. Johnii* of the Nilgiris. Colour nearly uniform greyish brown-black, with contrasting long white whiskers; the brows, hairs on cheeks, and those on the hands and feet, are deep black; there are traces of a paler tinge just perceptible on the occiput and about the croup; and the terminal three-fourths of the tail are grey. Entire length of hand 5 inch, and of foot  $6\frac{1}{2}$  inch. It is probable that this mountain animal varies in colour like *Pr. Cephalopterus* of the coast, to black, grey, grizzled, or light rufous brown; but all we have seen of the latter race have had the asbescent hue of the croup strongly contrasting, much more so than in *Pr. Johnii* of the Nilgiris, and the head generally brown as in the latter species, contrasting (though less so than in *Pr. Johnii*) with the black of the body (vide J. A. S. XVI, 1271). Should it be deemed worthy of a name, it might be designated *Pr. Ursinus*. At Newera Elia and scattered over the colder parts of the Island, is a species of very large monkey of a dark colour: some of those I saw were much bigger than the Wan-

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dura, and one that passed some distance before me, when resting on all four feet, looked so like a Ceylon Bear" (*Ursus labiatus*), "that I nearly took him for one." Forbes's "Eleven years in Ceylon." II, 144. In a letter from Dr Kelaart, he remarks that he has now several specimens of this monkey, one procured within 20 miles of Kandy. "Not one of them has the grey croup of *Pr. Cephalopterus*, and the hairs of the hands and feet are, in all, jet black. The ferruginous tinge of the hairs of the head and the grey of the occipital are present in all. The arms, too, are shorter than in *Pr. Cephalopterus* of the low country so that we may now consider this animal as distinct and confined to the mountainous regions of Ceylon—only in the Newera Elia specimens, the fur is longer and the tail more albescent."

Other species nearly affined in all but colour to *Pr. Cephalopterus* are *Pr. Pileatus*, Blyth, from the Tippera, Sylhet, and Khasya hills, and *Pr. Maurus*, (L.), from Java. In fact most of the black and rufous species of *Presbytis* are very closely affined, and several that are undoubtedly distinct are only separable apart by what might be considered trivial and insufficient distinctions. Another quadrumanous inhabitant of Ceylon, is the

(1018) *Stenopes Gracilis*, which is also found on the Coromandel coast.

(1019) *Cheiroptera*. The two common frugivorous Bats of India generally, *Pteropus Edulis* (vel *Edwardii* &c.), and *Cynopterus Marginatus*, are equally abundant in Ceylon. Dr. Kelaart sends a third, which is probably

(1020) *Pt. Leschenaultii*, *Dumeril*, though not completely according with the description. This small *Roussette* (or 'Flying Fox') measures about 6 inches from muzzle to tail-tip, the tail being about  $\frac{3}{8}$  inch and having its basal third invested by the interfemoral membrane. Expanse 19 or 20 inches; head  $1\frac{3}{4}$  inches; ears  $\frac{5}{8}$  inch; radius 3 inch; tibia  $1\frac{1}{2}$  inch; foot with claws 1 inch: upper-parts very thinly covered with short downy fur, of a dull brown colour; lower parts rather more densely covered with much paler brown fur. A specimen procured by Mr. Elliot somewhere on the Coromandel coast appears to be of the same species; but has the upper parts much more fully covered with brown fur, darkest upon the crown, and a whitish collar round the lower part of the neck. The hair on the sides of the neck, is longish and directed forward. Length of Radius  $3\frac{1}{2}$  in. The difference partly depends, no doubt, on the season in which the specimens were obtained: and the only other frugivorous Bat known to inhabit India is *Pt. Dussumieri*, Is. Geoff. vide J. A. S. XII, 176.

(1021) *Taphozous Longimanus* (Hardwicki), is a species and genus added by Dr. Kelaart to the fauna of Ceylon.

(1022) *Taphozous Brevicaudus*, Blyth, J. A. S.

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X. 970, is another species likely to occur as it was described from a specimen procured in Travancore.

(1023) *Megaderma Lyra*. Geoff. (or *M. Carnatica* Elliot, and *M. Schistacea*, Hodgson), appears to be common.

The species of *Rhinolophus* would seem to be numerous. Of true *Rhinolophus*, Mr. Waterhouse gives *Rhin. Insignis*, Horsfield with a mark of doubt against the specific name, from Ceylon, in his catalogue of Mammalia in the museum of Zoological Society (1838); and we have seen no true *Rhinolophus* from the peninsula of India, unless *Rh. Mitratus*, Blyth, (J. A. S. XIII, 483), from Chaibasa be deemed an exception. In a letter Dr. Kelaart informs us that he has since obtained a very large *Hipposideros*, and likewise a *Rhinolophus* as this genus is at present restricted. But of *Hipposideros*, Gray, there appear to be many species in Ceylon. Of the three noticed in Mr. Elliot's Catalogue of the Mammalia of the S. Mahratta country (*Madr. Journ.* X, 98), viz *H. Speoris*, *H. Murinus* and *H. Flavus* (vide J. A. S. XIII, 489), the first two are common; and *H. Ater*, Templeton, is a third described in J. A. S. XVII, 252. The last we have not seen; and Dr. Kelaart now sends two species additional to a specimen of *H. Murinus*. These are probably

(1024) *H. Vulgaris*, (Horsf.), apud Gray, of India and

(1025) *H. Pasillus*, (Tem.), of India, the specific name given with doubt by Mr. Waterhouse (*Catal-Zool-Soc-Mus*).

The first, though nearly affined to—is certainly not identical with—*Rh. vulgaris* apud Blyth, J. A. S. XIII, 488, from Arakan, length about 3 in. of which the tail is  $\frac{1}{8}$  in; expanse about 12 in. or nearly so; radius 2 in.; tibia  $\frac{7}{8}$  in.; ear-conch  $\frac{1}{2}$  in. The membrane surmounting the frontal pits exhibits three distinct small longitudinal ridges. Fur of the upper-parts pale greyish-brown at base, then dusky-brown which gives the prevailing hue of the surface, with very slight pale extreme tips. Lower-parts nearly uniform brown, with also slight horny tips.—Membranes dark. The other (*H. Ater*?) is smaller and possibly a variety only of *H. Murinus*, which (so far as can be traced in the dry skin) it resembles in structure. Colour whitish above, with blackish tips to the fur, the two colours being equally conspicuous; and below whitish brown. These Bats cannot be properly described unless when fresh or preserved in spirit.

The genera *Rhinopoma* and *Dysopus* have probably yet to be discovered in Ceylon. No doubt *Rh. Hardwickii* and *D. Pileatus* exist there.

Of ordinary Bats (*Vespertilioninae*), the

(1026) *Nyctcejus Heathii*, Horsfield, appears to be very common, as generally over the peninsula of India. In Bengal it is replaced by a smaller species of similar colouring. This is the *N. Heathii*, Horsfield P. Z. S. 1831, p. 113,



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length (of an adult male in spirit) 6 inch of which the tail measures  $3\frac{3}{8}$  inch; alar expanse  $16\frac{1}{2}$  inch; fore-arm  $2\frac{5}{8}$  inch; longest finger  $4\frac{1}{2}$  inch; tibia  $1\frac{1}{8}$  inch; foot with claws  $\frac{7}{8}$  inch. The difference of bulk and of size of the head, on comparison of this with the next species, exceeds that of the linear dimensions. The skull, also, with the teeth, is much larger in *N. Heathii* measuring  $1\frac{1}{8}$  inch in length, inclusive of the sagittal ridge and more protruding lower jaw; the upper canines project more than  $\frac{3}{16}$  inch from their long sockets. Hab. central and S. India and Ceylon.

(1027) *Nycticejus Luteus*, Blyth, *n. s.* length (of a large male)  $5\frac{3}{8}$  inch; of which the tail measures  $2\frac{1}{2}$  inch; expanse  $14\frac{3}{4}$  inch; fore-arm  $2\frac{1}{4}$  inch; longest finger  $3\frac{3}{4}$  inch; tibia  $1\frac{5}{8}$  inch; foot and claws  $\frac{1}{2}$  inch. The entire length of skull is barely 1 inch; inclusive of the greatly developed sagittal ridge. Hab. Bengal, Coromandel.

In structure both resemble *N. Belangeri* and both have the upper-parts when fresh of a very rich tawny or golden-brown colour, having a slight greenish cast; the lower parts fine yellow, more or less deep, and not unfrequently tinged with fulvous. By exposure to light the colours fade much in both species the rich yellow tinge gradually disappearing. *N. Belangeri*, (Tem.) is common to India generally and the Burmese and Malay countries, being in Ceylon equally abundant.

To these Dr. Kelaart adds another of about the same size, which was long ago forwarded from Chaibasa in Central India by Capt. S. R. Tickel. and may now be described as

(1028) *Nycticejus Tickeli*, Blyth, *n. s.* Length  $4\frac{1}{2}$  in. of which the tail measures  $2\frac{1}{8}$  in.; expanse 16 in.; length of fore-arm  $2\frac{3}{8}$  in.; of longest digit  $4\frac{1}{2}$  in.; tibia  $1\frac{5}{8}$  in.; foot with claws  $\frac{1}{2}$  in.; ears internally, from lowermost base  $\frac{5}{8}$  in.; and externally hairy for the basal half. Fur moderately long, soft, and straight, or a little wavy; of a pale fulvescent or whitish-fulvous colour, more or less tinged with maroon or vinous on the back: the membranes dusky, marked along the digits as in *Kerivoula Picta*, but the brighter colour spreading less upon the membrane, though the interfemoral is chiefly or wholly of this hue. There is a considerable growth of hair upon the basal half of the interfemoral membrane above, also along the tibia, and especially upon the toes: the face likewise is hairy around the eyes, and on the muzzle. Ears triangular and obtusely pointed: the tragus broad and semi-circular and suddenly narrowing at tip. Lastly, the dentition exhibits a peculiarity; this animal having a short, flat, obtusely trilobate or quadrilobate second pair of upper incisors, situate posteriorly to the usual large pair, and immediately behind the contact of each of the latter and the canine of the same side. This we have seen in no other species. Hab. Central

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India, Ceylon, and doubtless the intervening hilly country.

(1029) *Kerivoula Picta*, Gray;

*Vespertilio pictus*, Pallas (originally described from Ceylon); *V. Kervaulo* Boddaert.

*Kihavoula*, Cingh. (Kelaart),

Specimens sent dry and in spirit by Dr. Templeton and Mr. Layard are perfectly identical in species with one received from Java; and Dr. Cantor met with this species also at Pinang. Schinz gives it from Java, Sumatra, Borneo and, doubtfully, Ceylon. Mr. Layard says of it, "I have only met with this species about Colombo in any abundance, and I obtained one solitary specimen at Ambegamoa" Mr. Gray notices a *K. Sykesi* (we believe still undescribed), from "India, Calcutta;" this we do not know, but in Lower Bengal (where apparently very rare) and in central India, there is a fine species of nearly the same remarkable colouring, which is likely to be sometimes mistaken for *K. Picta*, though differing from it in many particulars. It appears to be *Vespertilio formosus* Hodgson, J. A. S. IV. p. 700, assigned by Mr. Gray to his *Kerivoula*, though improperly if it be the species here referred to, which accords in the number of its teeth with Mr. Hodgson's description, supposing that its exceedingly minute second upper præmolar was overlooked. This species and *K. Picta* and *Nycticejus Tickeli* present the same remarkable and beautiful style of colouring; but the dentition and other characters differ. (We have since received another and remarkably handsome large species of *Nycticejus*, with similar colouring of membranes, from the Khasya hills,—*N. ornatus*, Blyth,—a description of which will appear in a subsequent article.) The *Nycticejus* has the short and very broad muzzle, strongly developed sagittal, occipital, and parietal crests, and comparatively powerful teeth with the upper carnassiez adjoining the canine, which we observe in *N. Heathii* and the species affined to it; and there are two præmolars below, of which the second is the longer. *Vespertilio Formosus* (?) has three præmolars below, of which the medial (or that next to the *carnassiez*) is minute; and the upper carnassiez is widely separated from the canine, and in the interval are one developed præmolar, and posterior to this another which is excessively minute and liable to be overlooked: there are no ridges to the skull, or the middle one is barely traceable; the muzzle is comparatively narrow; and there are two upper incisors on each side of equal size: Chaffron a little concave. In *Kerivoula Picta* the chaffron is highly concave, the muzzle again much narrower, and there are two pairs of upper incisors of which the inner are longer, and so placed that on a direct front view they are alone visible, the second pair being concealed behind them; in *V. Formosus* (?) the four are equally visible on a front view. There are two præ-

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molars of equal size between the upper canine and the *Carnassiez* and two below of scarcely inferior size to the third or lower *carnassiez*. Lastly, the ears of *V. Formosus* (?) are not those of a *Kerivoula* (as exemplified by *K. Pieta*), but are deeply emarginated externally at one third of their length from the base, and above comparatively narrow and obtusely pointed: tragus also broader, shorter, and less attenuated at tip.

The only other Bat we have yet seen from Ceylon, is a minute species which appears to be extremely common throughout India, and is also met with at Singapore. We believe it to be *V. Coromandelicus*, F. Cuv., and to be identical with *V. Irretitus*, Cantor (*Ann-Mag N. H. IX*, 481,) from Chusan; and *V. Minutus*, Temminck, from the Cape of Good Hope, would seem to approximate, so far as can be judged from the brief description of Prof. Schinz. Size of the *Pipistrelle*, (Note. On comparison of British specimens of the *Pipistrelle* with an example in spirit sent by Mr. Hodgson from Nepal with the M.S. name *V. pallidi ventris*, we could discover no difference whatever. According to Schinz, the same species further inhabits Japan,) are on the average somewhat shorter in the fore-arm, which does not exceed  $1\frac{1}{2}$  in. in length; longest digit 2 to  $2\frac{1}{2}$  in.; expanse rarely exceeding  $7\frac{1}{2}$  in. (Dr. Cantor gives 8 in. as the expanse of his *V. irretitus*, but the other measurements sufficiently correspond). Total length  $2\frac{1}{2}$  in., of which the tail measures  $1\frac{1}{2}$  in.; ears broad, exceeding  $\frac{1}{4}$  in. in length; tragus  $\frac{1}{8}$  in., appearing lanceolate in the dry specimen, but in the fresh animal somewhat lunate, or a little curved forward and obtuse at tip. The fur is short, as compared with that of the *Pipistrelle*, and dingy fulvous-brown above at the surface, below paler and greyish fulvous; membranes dusky. The skull rather exceeds  $\frac{1}{2}$  in. long: the upper *carnassiez* is all but contiguous to the canine, and there is a minute præmolar situate internally and not visible externally; and two lower præmolars, of which the second or *carnassiez* is longer by about a third than the first. This Bat belongs to that large division of *SCOTOPHILUS*, Leach (apud Gray), the species of which have permanently two pairs of small upper incisors of about equal size: to these we prefer to restrict the name *SCOTOPHILUS* reserving *NYCTEJUS* for those in which the adults have only one large incisor on each side. Accordingly we term it (though somewhat doubtfully) *SCOTOPHILUS Coromandelicus*. This diminutive species is remarkable for the extreme velocity of its flight, as particularly shown darting about a room after being molested; and it is the most common of the small Bats about Calcutta. Mr. Hodgson did not meet with it in Nepal, and it possibly does not inhabit the sub-Himalayas. It is the No. 12 of Mr. Elliot's list in the *Madras Journal of Literature and Science*,

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(1030) *Carnivora*. Dr. Kelaart sent flat skins of what he considered to be two varieties of Jackals; but we regard them as mere individual variations of colour, such as are seen in all parts of India. No other wild canine animal has hitherto been discovered in the island.

(1031) *Viverridæ*, of these the Civet of Ceylon is probably not *Viverra zibetha*, L.; as supposed by Mr. Layard, but of a race procured by Mr. Walter Elliot from Travancore, and of which a specimen exists in the museum of the Zoological Society, referred to *V. zibetha* in Mr. Waterhouse's Catalogue of the mammalia in that collection (1838), No. 252. In that Catalogue it is marked "Sumatra, donor, Sir Stamford Raffles;" but we are the more inclined to suspect a mistake both as regards the donor and the habitat, from its being stated (formerly at least on the label of the specimen) to have been presented by the Duke of Northumberland. Both Mr. Elliot's Travancore specimen and that in the Zoological Society's museum exactly resemble the African *V. Civetta*, except that the dorsal mane ceases between the shoulders instead of being continued forward to between the ears.

(1032) *Viverricula Malaccensis*. (Gm.), and *Paradoxurus Typus*, F. Cuv., sent by Dr. Kelaart, as previously by Mr. Layard, are perfectly similar to Bengal specimens. There is also in the Island

(1033) *Paradoxurus Zeylonicus*. (Schreber), a very young example of which was formerly sent to the Society by Dr. Templeton, then of Colombo. This young animal is uniformly of the colour of the upper-parts of *Mustela vulgaris*, 'merely a little paler below, and shewing no decided trace of the longitudinal dorsal stripes. A living pair was afterwards presented to us by A. O. Brodie, Esq. of Putlam. These were then not fully grown, and were paler than the last, with the limbs darker, and the three longitudinal dorsal streaks distinct. The female died in this colouring, and is now preserved in the Society's museum; but the male still lives, and has become considerably deeper in his general hue. Of two specimens now sent from Newera Elia by Dr. Kelaart, one is again deeper-coloured than the living male, except its tail which is paler, and the dorsal stripes are inconspicuous though distinctly traceable: the other is much darker, considerably more so indeed than *Lutra vulgaris*, with remarkably handsome fur, and no trace of the dorsal streaks; the tail paler, with a subterminal yellowish white ring—exhibiting thus the tendency to partial albinism which is so often observable about the tail tip, and sometimes the feet and even the body, of animals of this genus, as especially the common *P. Typus*. We do not hesitate in considering all these varieties of colour in different specimens of *P. Zeylonicus* to have no special importance; but on present data it is probable that those which inhabit high



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up on the mountains (*P. montanus*, Kelaart,) have finer and darker-coloured fur than those of a lower region.

(1034) *Herpestes*. There are four species of Mongoose (*Herpestes*) in Ceylon:

(1035) *H. Vitticollis*, (Bennet), is not uncommon in the interior; and

(1036) *H. Griseus*, (Geoffroy), appears identical with the race of Bengal, the nose and paws of the only specimen we have seen being, however, considerably darker. This specimen was sent by Mr. Layard from the Jaffna peninsula; and he remarks that there is "another variety of Trincomali which accords exactly with the Indian animal." Dr. Kelaart states, in a recent communication. "I have now two other species of *Herpestes* besides the *H. Griseus* and *H. Vitticollis*,—one like *H. Auropunctatus*, Hodgson, but not it, is very like *H. Griseus*, except that the grey of the hair is in this fulvous or yellow (if new, *H. fulvescens*, mihi): the other is of a dark ruby red; tip of tails and feet black; ferruginous-red face; and as large as *H. Vitticollis*." The former of these is probably *H. Auropunctatus*; and the latter, we have little doubt, is a very distinct species formerly sent on loan by Mr. Elliot, who procured it in the south of India, but has not given it a name, so far as we are aware. His specimens, however, were smaller than adult *Vitticollis*, and more affined to *Griseus* in structure. The following notes were taken of them, and we may here characterize the species as

(1037) *Herpestes Elliotti*, Blyth. Entire length 26 inches of which the tail measures half: length of fore-limb, to end of claws,  $3\frac{1}{2}$  in; and of hind-foot with claws  $2\frac{1}{2}$  in. General colour as in *H. fuscus*, Waterhouse, of the Nilgiris, but the pale portion of the annulated hairs whiter,—the four limbs blackish above,—and the tail (which is less bushy than in *H. fuscus*) tipped with black for the terminal  $2\frac{1}{2}$  or  $3\frac{1}{2}$  in. In this specimen there was an appearance of a collar, from the greater development of the blackish portion of the hairs and of the whitish portion lower down, in those forming a sort of nuchal ring. Another specimen had the general cast of colour redder,—a maroon-red prevailing very bright on the four limbs above the black feet, and upon the tail where bordering on its black tip. Hab. S. India.

(1038) *Felidæ*. Of Cats, there are, in Ceylon, *F. Pardus* (vel leopardus) and its black variety *F. Viverrinus* and *F. Chaus*. *F. Tigris* and *F. Jubatus* are unknown: and *F. Bengalensis* (var *wagati*, Elliot), and *F. Rubiginosa*, Is. Geoffroy, both inhabitants of peninsular India, remain probably to be discovered.

(1039) *Mustelidæ*. The only Otter we have seen from the Island is *Lutra Nair*, F. Cuvier, which is not uncommon; and it is also the only species which we have seen from the peninsula of

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in Travancore and sent on loan by Mr. Elliot, may prove to be that of another. This specimen is remarkable for having the whole upper half of the head and body and of the basal moiety of the tail, covered only with the short and close downy fur common to the genus, with merely a very few scattered piles of the ordinary longer intermixed. The under half of the head and body and rest of the tail are clad as usual, precisely as in *L. Nair* and similarly coloured; but what is remarkable, is the abrupt and well defined straight line of demarcation separating the upper and lower halves of the animal, and passing immediately below the ear-coch. We suspect, however, (in fact feel satisfied,) that the individual was killed while changing its coat; but its size is still remarkable, being equal to that of the common Bengal Otter (*L. Chinensis*, Gray, vel *tarayensis*, Hodgson &c.) Nevertheless we consider it identical with *L. Nair*.

(1040) *Ursidæ*. The Bear of Ceylon is the *Ursus* (vel *Prochilus*) *Labiatus* of all India southward of the Himalaya, and which is peculiar to this country.

(1041) *Insectivora*. *Sorex* is the only genus as yet ascertained; but the discovery of *Tupia Elliotti*, Waterhouse (*Proc. Zool. Soc.* July 24th, 1849), in the eastern ghats of peninsular India, renders it likely that this genus also may have its representative in Ceylon. Perhaps, also, the Hedgehog of the Nilgiris (*Erinaceus Micropus*, Blyth, J. A. S. XV, 170), or other species of this genus, may inhabit the Island; the more especially as Dr. Kelaart remarks that there are two species of Hedgehog preserved in the Medical Officer's museum at Colombo, though whence brought is not known.

(1042) *Sorex Murinus*, L. (apud Gray), the common Indian Musk shrew, is mentioned both by Mr. Layard and Dr. Kelaart; and the latter gentleman has forwarded two mountain species for examination, both of which we consider to be new and undescribed.

(1043) *Sorex Montanus*, Kelaart, n. s. A typical *Sorex*, with dentition &c. as in *S. Murinus*. Total length 6 inches of which the tail measures  $2\frac{1}{4}$  inch. hind-foot, minus claws,  $\frac{5}{8}$  in. colour uniform dusky or dusky-slate, with the tips of the fur rufescent. Dr. Kelaart sent two specimens from Newera Elia, which, most decidedly, are of the same species; but one of these had a very powerful odour when fresh, and the other was inodorous.

(1044) *Sorex Macropus*, Blyth, n. s. General aspect of typical *Sorex* with colourless teeth and scattered long hairs on the tail; the ears scarcely visible beyond the fur; and the feet remarkably large. Length about  $6\frac{1}{2}$  in. of which the tail is  $2\frac{1}{4}$  in; hind-foot with claws nearly  $\frac{7}{8}$  in; the fore-foot  $\frac{1}{4}$  in. broad, with long and but slightly

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in length. Fur somewhat long and very soft, uniform blackish, very faintly tinged rufescent; the extreme tip of the tail dull white in the only specimen examined. Teeth small, the upper quasi-incisors shorter and less strongly hooked than in the typical *Sorex*, with the posterior spur large; the lower quasi-incisors serrated, showing two depressions, and therefore a row of three coronal points. Behind the upper false incisors a series of four small præmolars precedes the *canassiez*, the two medial being of equal size, the first rather large, and the fourth smaller; and below are the usual two (inclusive of the *canassiez*), as in the genus generally. Accordingly, this species cannot be brought satisfactorily under any of the subdivisions of *Sorex* yet instituted; and its very large feet, more especially, indicate that it should form a particular subdivision. Both this and the preceding species are found at Newera Elia and to 1000 feet below. (The shrews have very anomalous dentition; and we consider their quasi-incisors above and below to be *modified præmolars*. The upper canines appear to be wanting throughout the order, and the lower canines when present are generally small, the first præmolar above and sometimes below being magnified to assume the form and fulfil the function of canines (vide XIX p. 216). In the shrews no intermaxillary bones have been traced at any age and therefore the upper front teeth are decidedly not incisors, as they are generally termed: if canines, they would be an anomaly throughout the order; and extracted from the socket they have more the character of præmolars, exhibiting a second fang coalescent or imperfectly separated (i. e. originally distinct no doubt) proceeding from the posterior spur or cusp. The lower front teeth have also two coalescent fangs, shewing a broad and deep median groove on the inner side, and a similar but less extended groove on the outer. Thus, at least, in *S. Murinus*. It is not unlikely that in some of the other species (or subgeneric forms) the two fangs may be permanently separate.

In addition to *S. Murinus*, *S. Montanus* and *S. Macropus* in Ceylon, Dr. Kelaart writes that he has lately received two specimens of a large black Shrew double the size of the last which he also considers to be distinct and probably undescribed.

## RODENTIA.

(1045) *Sciuridae*. Of this family, Dr. Kelaart sends two species of Flying Squirrels. One is

(1046) *Pteromys Oral*, Tickell, found throughout the peninsula of India. The other is a magnificent

(1047) *Sciuropterus*, which possibly may be a fine adult of the species described as *Sc. Fuscocapillus*, Jerdon, Blyth, J. A. S. XVI, 867, from a younger and comparatively inferior specimen. We incline, however, to the opinion that it is distinct; and Dr. Kelaart terms it,

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(1048) *Sciuropterus Layardi*, Kelaart. Nearly allied to *Sc. Caniceps*, Gray, of the S. E. Himalaya, from which it differs in having the fur of its under-parts of a dull non-fulvescent white, the parachute membrane being margined with pure white fur, lengthened and conspicuous at the angle. Face grey, except the forehead which is rufous-brown, like the rest of the upper parts. A dusky spot on the nose. Whiskers long and black; and there is a tuft of long soft hairs below the ears and a smaller tuft before them. The ear-conch is  $\frac{3}{4}$  inch long posteriorly, ovate and somewhat narrow. Fur very dense, the basal three-fourths of the piles dusky, sinuous, and fine in texture; the tips coarser, and shining dull rufous-brown, forming the surface colour. Tail flat and broad, above nigrescent, and below deeper blackish except at tip. Feet greyish, with a faint rufous tinge on the hind only. Length about 2 ft., of which the tail with hair measures half; hind foot, from heel to tip of claws,  $2\frac{1}{2}$  in.; fore-foot to membrane,  $1\frac{1}{2}$  in. Hab. Mountains of Ceylon (Dimboola).

(1049) *Sciuri* of Ceylon, these are treated of in J. A. S. XVIII, 600 *et seq.* where five species are enumerated, to which Dr. Kelaart has now added

(1050) *Sc. Triliniatus* Waterhouse, (v *Delesserti*, Is. Geoffroy), identical with the race of the Nilgiris and Malabar. He has also favoured the Society with a fine example of

(1051) *Sc. Tennentii*, Layard, *loc cit.*, perfectly similar to that sent by Mr. Layard; and with a young specimen of

(1052) *Sc. Macrourus*, remarkable for having the terminal three-fourths of its tail unmixed white or slightly yellowish white. "The *Sc. Macrourus*," he remarks, "I have seen of various colours; some black: and I am inclined to think the *Sc. Tennentii* only a large variety of it *Sc. Macrourus*, even changes colour from brown to black," Mr. Layard, however, insists that "*Sc. Macrourus*, the common large Squirrel of our western coast, never intrudes on the haunts of *Sc. Tennentii*, nor is intermingled with it in its own locality." The two seem to hold, therefore, the same mutual relation as *Presbytis Thersites* and *Pr. Priamus*, or *Pr. Ursinus* and *Pr. Cephalopterus*. The rufous capped striped Squirrel noticed in a foot-note to J. A. S. XVIII. 602, Mr. Layard terms *Sc. Kelaarti*, Layard; but it does not appear sufficiently distinct from *Sc. Brodiei*. According to Mr. Layard, "*Sc. Tristriatus* is the common low country Squirrel" (of the island). "*Sc. Brodiei* is common on the west coast from Point Pedro and Putlam; replacing *Sc. Tristriatus*, from which it is easily distinguishable by its pale colour and the long pencil-tuft at the extremity of the tail, this, however, is often wanting in stuffed specimens, and indeed even in live ones, the hair being but slightly attached to the skin:



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*Sc. Kelaarti* entirely replaces all the other small *Sciuri* from Tangalle and Hambantotte, and I should fancy extends round to Trincomali. It may be described as very like *Sc. Palmarum* of India, but the head as much redder, the halves of the back and belly are more blended, and the animal is altogether smaller." These three little squirrels, if different are exceedingly affined; and all have the rufous colouring under the tail which is never seen in *Sc. Palmarum*. It would be interesting to ascertain if their voices differ, for that of *Sc. Tristriatus* is remarkably unlike the voice *Sc. Palmarum*.

In XVIII, 603, it is remarked that there are no *Sciuri* more difficult to understand than the group exemplified by *Sc. Modestus*, Muller, &c. The three Darjiling specimens there referred to as having the thighs externally of a bright ferruginous colour, exemplify the *Sc. Lokriah*, Hodgson, apud Gray, who terms it the "Red-thighed Squirrel" (vide *Catal. Brit. Mus. Mammal.*); and the *Sc. Lokriah*, H. apud, Blyth, (J. A. S. XVI, 873) Mr. Gray designates as *Sc. Subflaviventus*, McClelland. In Dr. Cantor's list of the mammalia of the Malayan peninsula *Sc. Modestus*, S. Muller is cited as a doubtful synonyme of *Sc. Tenuis*, Horsfield, and the habitats given by Dr. Muller ("Java, Sumatra, Borneo, Canton,") are transferred, but Mr. G. Moxon has recently presented the Society with a specimen from Malacca, which we take to be the Malayan peninsula race referred to *Sc. Modestus*, and which is very distinct from *Sc. Tenuis* of Java and apparently differs also from the *Sc. Modestus* figured by Dr. Solomon Muller. Length, about 8 inches of tail 9 inches, its hair reaching  $2\frac{1}{2}$  inches farther; hind-foot with claws  $1\frac{2}{3}$  in. Colour of the upper-parts grizzled black and Golden-fulvous, deeply tinged with ferruginous on the croup and tail: under parts pale ashy; and limbs grizzled ashy externally, whiskers long and black, terminal two-thirds of the tail banded with black, the alternating fulvous bars whitish towards the end: no ferruginous on the face, sides and limbs, as in Dr. S. Muller's figure of *Sc. Modestus*. From *Sc. Nigrovittatus*, it differs in having no lateral stripes, nor the rufous tinge about the muzzle and cheeks; also in the decided ferruginous tinge of its croup and tail and the very distinct bands upon the latter. In the same collection were three specimens of *Sc. Laticaudatus*, S. Muller and Cantor, which is doubtless the *Rhinosciurus tupaoides* Gray from Singapore, and possibly distinct from true *Laticaudatus*. One of these has been presented for the Society's museum.

*Muridæ*.—Or the Rat tribe.

(1053) *Gerbillus Indicus*, F. Cuvier; from which we now doubt whether *G. Cuvieri*, Waterhouse, and *G. Hardwickii*, Gray, differ constantly in any respect (vide J. A. S. xv, 138). At least specimens are perfectly similar from different

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parts of Bengal, S. India, and Ceylon; but we have not yet examined the skull of a Cinghalese example. Dr. Kelaart remarks that Kandyan examples differ in no respect from the Gerbil of the plains of Ceylon.

(1054) *Golunda Elliotti*, Gray, *Mag. N. H.* 1837, p. 586: *Mus hirsutus*, Elliot; *M. coffæus* Kelaart. "The Coffee Rat of Ceylon, a very destructive species, rooting up the coffee trees, and nearly destroying whole plantations in one night, when some plant on which they generally live is scarce in the Jungle," (Kelaart).

(1055) *Golunda Meltada*, Gray, *Ibid*: *Mus lanuginosus*, Elliot; *M. newera*, Kelaart. We have little doubt about the correctness of the identification of this species, although there is no S. Indian specimen in the Society's museum to compare with it. In this type, as in *Gerbillus*, the upper rodentia tusks are distinctly grooved.

(1056) *Mus Bandicota* Bechstein: *M. giganteus*, Hardwicke; *M. ikria*, Buch. Ham; *M. nevorivagus*, Hodgson, &c. "Common in the paddyfields round Cotta, doing great damage to the crops and embankments; the natives consider them very good-eating." (Layard).

(Mr. Layard has also procured *M. Indicus*, Geoffroy, v. *arvicola indica, et bengalensis, et Mus Kok*, Gray, *M. providens*, Elliot, and probably *M. pycioris*, Hodgson, *Ann. Mag. N. H.* XV, 267, if not also *Nesokia Hardwickii*, Gray, *ibid.* X, 265. "Not uncommon about Jaffna. The natives esteem them great delicacies, and they are much sought after.") From a recent letter from Dr. Kelaart, he also appears to have met with this species at Kandy.

(1057) *Mus Decumamus*, L. (*M. Rattus*, L. Included by Mr. Layard. In Calcutta, we have only obtained this species from the shipping, and may remark that there is a brown variety of it so much resembling the *M. Setiger*, Horsfield,—an arboreal species which is very unlikely to be often conveyed about in ships,—that we cannot help strongly suspecting that the black and brownish specimens from Van Dieman's Land assigned to *M. Setiger* (*setifer*) in Mr. J. E. Gray's catalogue of the mammalia in the British museum, pertain really to the European Black Rat. Of this we have also fine examples from France.)

(1058) *M. Nemoralis*, Blyth, n. s. (*M. setifer* apud Layard, (probably not, however, as Mr. Layard supposed *M. setifer* was "procured in a paddy field near Galle.") with a considerably longer tail, exceeding the head and body in length in the proportion of five to four. In *M. Setifer*, the tail is shorter than the head and body. The whiskers are also blacker, at least than in what we take to be a half-grown specimen of *M. Setifer* from Malacca. Dr. Kelaart sent an adult specimen and one two-thirds grown from Ceylon; and Mr. Firth lately obtained three young living examples from a

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huge nest placed among the branches of a dense mango tree, in the vicinity of Calcutta. Two of these soon after made their escape, and the third we possess in spirit. We have since ascertained its occurrence in the Botanic garden, and other likely sites in the neighbourhood of Calcutta. We had not the opportunity of actually comparing an adult with the Ceylon specimens, but it certainly appeared to be specifically identical with them; the belly being merely somewhat albescent. It exhibited a manifest affinity for *M. Rufescens*, but was much larger, less rufescent, and the belly dull whitish instead of pure white. Shot on the bough of a tree.

(1059) *M. Rufescens*, Gray: *M. flavescens* et *M. rufus*, Elliot (nec Waterhouse); *M. arboreus* B. Hamilton, Ms. This also is a tree Rat, keeping especially to cocoa-nut palms, though by no means confined to them. According to Buchanan Hamilton, it nestles in the cavities of trees, and not (like the preceding species) among the branches. We have obtained a single individual variety, in which the white belly is much less abruptly defined than usual. One that escaped in our private residence took up his abode for some days (till we saw no more of him) on the top of a glass-folding door, not burrowing like the common house Rat. They do, however, as Buchanan Hamilton remarks, visit out-houses and similar places by night; but pass the day on trees, chiefly cocoanuts (being very destructive to the young fruit,) and bamboos.

(1060) *M. Kandianus*, Kelaart, n. s. very like the preceding species, but the fur softer and of finer texture, and less rufescent in color. Whiskers very long, fine, and black. Peculiar to the mountains, and we strongly suspect it to be only a mountain variety of *M. Rufescens*; but require to examine more perfect specimens and to compare the crania and dentition, before coming to a final decision *M. Niviventer*, Hodgson, would seem to be affined.

Other species of *Mus* are enumerated by Dr. Kelaart, as inhabitants of Ceylon; but they require further examination.

(1061) *Mus Oleraceus*, Sykes, is also a Bengal animal; and the Society possesses a specimen from Assam quite similar to others from S. India. *M. Dumeticola* and *M. Povens* Hodgson, require to be carefully compared with it.

(1062) *Mus Terricolor*, Blyth, must be closely affined to *M. Cervicolor*, and *M. Strophiat* Hodgson, Mr. Elliot sent it from S. India together with *M. Lepidus*, from which he did not distinguish it. Indeed it much resembles that species in form and colour, but the face is very much shorter, and the fur short, soft, and not spinous in the least degree. Its colour varies, however, according to the soil; those of the alluvium of the Ganges being darker than specimens from the ferruginous soil to the westward. All have the

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hue of the upper-parts as in the various affined species. Length  $2\frac{1}{2}$  in; of tail  $2\frac{1}{8}$  in; ears  $\frac{1}{4}$  in; hind-foot  $\frac{9}{16}$  in. Inhabits gardens, and is very numerous in the open fields; together with *Gerbillus Indicus* and *Mus Indicus*.

(1063) *Mus Mani*, Gray, who refers to this the *M. musculus* apud Elliot, is consequently the common house Mouse of India generally, which differs from *M. Musculus* in having a longer tail, and shorter fur which is not so dark in colour. Length of head and body 3 in. and of tail  $3\frac{1}{2}$  in. *M. Dubius*, *M. Homourus*, and *M. Urbanus*, Hodgson, required to be compared with it.

(1064) *Mus Berdmorei*, a remarkable species from Mergui by the name *M. Berdmorei*. Length about a foot, of which the tail is not quite half; ears posteriorly  $\frac{3}{8}$  in. hind foot,  $1\frac{3}{8}$  in. Fur shortish, even, coarse and hispid but not spinous, of one quality, with no long hairs intermixed: its colour grizzled grey above, unmixed with rufous; below and on the feet pure white. Rodential tusks white. Tail rather more copiously clad than usual with short hairs.

(1065) *Hystriidae*. A young Cinghalese Porcupine sent alive by Mr. Layard, and since mounted in Society's museum, is evidently of a new species most nearly affined to the common but undescribed porcupine of Bengal. The last and most satisfactory authority upon the species of porcupine is Mr. Waterhouse's 'Natural History of the Mammalia,' Vol. 2. This author reduces the known species of *Hystrix* as now limited (including *Acanthion*, F. Cuv.) to four, viz., two crested species of large size, the European and N. African *H. Cristata*, L. and the Asiatic *H. Hirsutirostris*, Brandt (v. *leucura*, Sykes); and two crestless species of much smaller size, the Sub Himalayan *H. Hodgsonii*; Gray (v. *alophus*, Hodgson), and *H. Longicauda*, Marsden (v. *Acanthion javanicum*, F. Cuv.), of the Malayan peninsula and archipelago. Of these the Society's museum contains two skulls, a stuffed head, ditto very young animal, and a flat skin (deprived of the crest) of a half-grown example, of *H. Hirsutirostris*; flat skins of old and young of *H. Hodgsonii*; and a stuffed specimen of *H. Longicauda*: also three skulls (one of them from Assam), agreeing with Mr. Waterhouse's description and figures of the skull of *H. Hodgsonii*; but on two of them the names "*Hystrix cristata*" and "crested porcupine" are written by one of our predecessors, so that they perhaps belong to the small crested species of Bengal, and not to the Sub-Himalayan crestless Porcupine. In Mr. Walker's list of the mammalia of Assam (*Calc. Journ. Nat. Hist.* III, 267) the only porcupine mentioned is *H. Cristata*, which should at least indicate the existence of one of the crested species in that province. No. 1 is that of an old animal, and is rather larger than the two described by Mr. Waterhouse; measuring  $5\frac{1}{4}$  in. in total



No. 3 is that of a young animal, in which the naso-frontal sutures form each a straight line, meeting its opposite at an obtuse angle posteriorly; this, however, is merely due to immaturity, the forehead not having commenced to budge as in the adult animal. *H. Hodgsonii* and *H. Longicauda* are nearly affined species, but exhibit well marked distinctions in the cranium: and externally they are most readily characterized apart by the latter having a strongly marked white demi-collar, proceeding upward from the throat, which either does not occur or is barely indicated in the other and by its body spines (i. e. spinous bristles, as distinct from the quills,) terminating in sharp and rigid points, not flexible and setaceous tips as in *H. Hodgsonii*.

(1066) *H. Bengalensis* Blyth. The common Bengal Porcupine (and of Assam?, Sylhet, and Arakan, rare near Calcutta.) *H. Bengalensis*, resembles the two last mentioned in size and general character; or it may attain to a larger size, though not nearly to the magnitude of *H. Cristata* and *H. Hirsutirostris*. Since the above descriptions were written, we have seen, in the Barrackpore menagerie, fine living examples of *H. Hirsutirostris*, *H. Bengalensis*, and the *Atherura* inhabiting the Tippera and Khasya hills, which latter is well figured and described by Buchanan Hamilton, and like them it does not possess the two great lateral masses of very long, slender and flexible quills, impending and concealing the much shorter, thick, rigid and acutely pointed quills which constitute the armature of the animal: but it has only a very few long and slender quills, gradually thickening in the basal half and attenuating much in the terminal half, intermixed with the ordinary or weapon-quills towards the front and at the sides. The latter are much longer and thicker than in the two crestless species; and the body spines are still flatter and more strongly grooved, and terminate towards the neck in slight setae, towards the quills in rigid points. There is a distinct but small thin crest, (not dense and massive, as in the two large species,) the longest bristles of which measure 5 or 6 in., and are tipped with white for the terminal third: and the white demi-collar is as strongly marked as in *H. Longicauda*. General colours as in *H. Hodgsonii*; the quills generally having the basal half white, the rest black, most of them with a white tip more or less developed: the few long and flexible quills are white with a narrow black band about the centre. Tail as in the two crestless species, with similar pedunculated quills.

The Cinghalese Porcupine sent by Mr. Layard, though young, we do not hesitate to name as another distinct species.

(1067) *H. Zeylanensis*, Blyth. Fortunately we have a stuffed Bengal Porcupine of about

the same size and apparent age to compare with it. It is nearly affined to *H. Bengalensis*, with a similar but more developed crest of long bristles; these are of the same brown colour as the body spines, and have each one obscure pale annulation and beyond it a white annulation at less than two-thirds of its length: the quills are slenderer than in the porcupine of Bengal, and are black, with white extreme base; mingled with others longer and more slender, which are chiefly very pure white, often with dark base. Spines, much flattened and very much grooved, and coarser over the limbs than in *H. Bengalensis*; the anterior terminating in very slight flexible setae, becoming gradually obsolete towards the quills, upon the hind-limbs especially, the spines are quite as coarse as on the sides of the body; whereas in the Bengal Porcupine they are there much finer and more bristle-like. White demi-collar barely indicated. The general colour is much as in the others, but a little more rufescent, and the spines are even more shining than usual; the white of the quills being also much purer than in either of its congeners. The body-colour pales remarkably on the hind-limbs. The ear-couch is formed most as in *H. Hirsutirostris*, being somewhat squared above, with strongly marked posterior angle; and (in the specimen at least) they are much more scantily clad with hair than in *H. Bengalensis* and *H. Hodgsonii*. Lastly, the pedunculated quills of the tail are considerably more elongated than in either of the other species. In the small well mounted specimen described, standing  $5\frac{1}{2}$  in. high at the shoulder, some of the bristles forming the crest are 6 in. long: in a Bengal Porcupine of the same size they are not  $4\frac{1}{2}$  in; but still appear conspicuously in the latter, from being all broadly and evenly tipped with white. It is not improbable that the large *H. Hirsutirostris* may likewise be proved to inhabit the same island; and likely enough there is a second and small species, perhaps *H. Zeylanensis*, in India. The latter is described by Mr. Layard to be common in the Chilaw and Jaffna districts, doing great damage to the cocoanut trees when young and tender. The Natives term them *Oat Oara* ('thorn pig').

The skulls of *H. Bengalensis* and *H. Zeylanensis* remain to be examined and compared with those of *H. Hodgsonii* and *H. Longicauda*; for to the latter, and not to the two great Porcupines, these two small crested species are more immediately affined. The want of crest is accordingly no distinction of *Acanthion* from *Hystrix*, as Mr. Gray would separate them, but the absence of the two great lateral masses of very long slender quills, impending the others and even the tail in the two large species, affords a better external distinction. We follow Mr. Waterhouse and others, however, in assigning the whole to *Hystrix* as now limited.

(1068) *Leporidae*. The Hare of Ceylon is *Lepus Nigricollis*, F. Cuv. (*L. melanaachen*, Tem) identical with the species of peninsular India, Java, and the Mauritius, from each of which regions the Society possesses a specimen. The Hare of Bengal and all upper India is *L. Ruficaudatus*, G. Geoffroy; Mr. Waterhouse erroneously supposing *L. Nigricollis*, F. Cuv., to be the Hare of Bengal. We know but of twelve species of *Rodentia* in all Lower Bengal, which are as follows:—1 *Sciurus Palmarum*,—2 *Gerbillus Indicus*,—3 *Mus Indicus*, Geoffroy (M. Kok, Gray),<sub>1</sub> common field Rat.—4 *M. Terricolor*, Blyth, common field and garden Mouse.—5. *M. Bandicota*, in marshy localities.—6 *M. Decumannus*.—7 *M. Rattus* observed only among the shipping in the river.—8 *M. Flavescens*, chiefly in coconut trees and about bamboos.—9 *M. Nemoralis*, trees,—10 *M. Manei*, Gray; domestic Mouse.—11 *Hystrix Bengalensis*.—12 *Lepus Ruficaudatus*.

(1069) *Pachydermata*. The [Pachyderms of Ceylon are the Elephant, the wild Hog, and the Dugong; which last according to Mr. Layard is common in the Bay of Calpentya, on the western coast, and bears the name of *Talla Maha* among the natives who highly esteem its flesh. A skull of a Cinghalese wild Boar, sent by Mr. Layard differs much in contour from skulls of the wild Boar of India; indeed so much, that we feel justified in denominating it as a peculiar species.

(1070) *Sus Zeylonenses*, Blyth, n. s. skull longer than that of the Indian Boar, nearly straight in profile, very much contracted at the vertex. Palate contracting posteriorly to less than 1 in. from the magnitude of the last molar, which is considerably larger in both jaws than in the wild Boar of India, the upper measuring  $1\frac{3}{4}$  in. long, by  $\frac{1}{8}$  in. broad anteriorly. Vertex narrowing to 1 in. only in breadth. Total length of skull, from vertex to tips of nasals,  $16\frac{1}{4}$  inch. Altogether, this skull approximates closely in contour to the figures of the skull of *Sus Barbatus* by Dr. S. Muller and M. Temminck.

Note.—There are two races, if not even species, of Indian wild Boars distinguished respectively by a broad and by a narrow vertex in specimens of the same age. In the former the vertex where narrowest measures  $2\frac{1}{4}$  in. wide; in the other barely  $1\frac{3}{8}$  inch. In other respects they are similar, except that the molars are larger in the race with narrow vertex. This so far as we have seen, is the Bengal animal; whereas that with broad vertex inhabits Kutak, and perhaps the Indian peninsula generally. A skull from Arakan exhibits an intermediate character, with vertex  $\frac{3}{4}$  inch wide, and the molars large. The Bengal Boar has long borne a reputation for higher courage than that of the upper Provinces at least, which may depend upon its special distinctness. While so many affined species of *Sus* have been distinguished by the Dutch Zoologists in the

archipelago, it is not unlikely that a plurality of continental species may have remained undetected.

In Dr. Solomon Muller's figures of the skull of *Sus Ferrucosus* the young but full grown animal is represented to have a broad vertical plane which is excessively contracted in an old animal: but the oldest Indian skull of several now before us is one with the broad vertical plane. Since writing the above we find that Mr. Gray distinguishes a Boar skull from the Nilgiris by the name *Sus Affinis*; while specimens from the Nepal "hills" and *Tarai* and one from Malabar, he designates *Sus Indicus*.—*List of the Osteological specimens in the collection of the British Museum.*

## RUMINANTIA.

(1071) *Cervidae*. The "Elk" of Ceylon appears to *Rusa Hippelaphus* of India generally, vel *cervus equinus*, F. Cuv., of the Malayan peninsula, Sumatra, and Borneo; found also in the intervening Burmese countries. *Axis Maculatus* is common: also *Muntjacus vaginalis* of which the heads of both sexes were sent for identification by Dr. Kelaart. *Meminna Indica* abounds. "The *Moschidae*," writes Mr. H. N. Turner, jun. (*Ann Mag*, N. H., 2d series, VI. 482) "must, of course be distinguished from the *cervidae* by their trilocular stomach, and by the presence of the gall bladder." We have never found the latter to exist, however, in the chevrotains. Lastly Dr. Kelaart informs us of the existence of a species affined to *Axis Porcinus* and probably undescribed; living examples of which he has recently shipped for the London Zoological gardens. These, we now learn, have arrived in London, and are considered to be distinct and new. We are also informed that the (so called) Hog Deer of the banks of the Indus (C. Dodin? Royle,) is distinct from the *Axis Porcinus* of Bengal, Nepal, Assam, Arakan, Tenasserim, &c. While on the subject of Deer, it may be remarked that Mr. Gray, in his list of osteological specimens in the collection of the British Museum, give as distinct species of the Elaphine group "*Cervus Cashmirensis*, Falconer MS.,<sub>1</sub>" and "*Cervus* (Wallichii?) *Affinis*" of Mr. Hodgson. We have little doubt that these will prove to be the same, and refer to figs. 8 and 9 of the plate accompanying J. A. S. X, 750 representing a horn of the Kashmir Stag, for comparison with Mr. Hodgson's various figures of those of *C. Affinis*, J. A. S. X, 722; XIX, 466, 519). We continue to be, as formerly, of opinion that the species is *Cervus Wallichii*, Duvaucel, figured and described from a young animal at that time living in the Calcutta Botanic Garden; the identical pair of horns it bore being now in the Society's museum, and represented J. A. S. X. 750 pl., fig. 7. In all probability, it is also the *Irbisch* or great stag of Siberia mentioned by Stahlenberg; if not likewise the Persian *Maral*, which we saw alive in



London; and (as remarked on a former occasion, J. A. S. X., 747,) we 'cannot doubt that, with full maturity, this noble species possesses a terminal crown to its antlers, assuming thus every feature of a typical member of the elaphine group,' the crown being, however, probably as in the Wapiti (*O. Canadensis*, vide X. 75, pl., figs. 4, 6), rather than as typically in the European Stag (*O. Elaphus*). The *O. Wallichii* as figured by Mons. F. Cuvier, most closely resembles the Wapiti Stag of North America; and the similitude of the horns (at least at a particular age?) is exhibited in figs. 2 and 8 of the Plate referred to. Compare also the young *Wallichii*, fig. 7, with the young, *Mural*, fig. 10. Since the foregoing was in type, we have chanced to refer to the figure of the Wapiti in Dekay's volume on the Mammalia of the state of New York, and the horns represented in that figure are absolutely similar to those of the great Asiatic Stag, as the latter are given by Mr. Hodgson.

(1072) *Bovidae*. The wild Buffalo is common; and it would seem that formerly *Bos Gaurus* inhabited the island, inasmuch as the *Guavera* of Knox can scarcely refer to aught else; but, if so, it has now been exterminated for nearly a century.

(1073) *Edentata*. Mr. Layard writes—"I think our island *Manis* is identical with the Indian *M. Brachyura*, but it requires identification. It is not uncommon. I have also seen another species which I have little doubt will prove to be the long-tailed Pangolin of authors;" or can this be *M. Leptura*, Blyth, J. A. S. XI, 454, XVI, 1293?

(1074) *Cetacea*. The Dolphins and Porpoises of the coast and the large Whales occasionally stranded, are all in need of accurate determination.

(1075) MAMMALIA, procured at or near the station of Cherra Punji in the Khasia hills, north of Sylhet, described by E. BLYTH, Esq., in Beng. As. Soc. Jour. No. VI of 1851.

(1076) *Presbytis Pileatus*, Blyth, (J. A. S., XII, 174, XIII, 467, XVI, 735. Procured at Cherra Punji.

(1077) *Dysopus Plicatus*, (B. Ham.) nearly as dark coloured as the Malayan race termed *D. Tenuis*, (Horsfield), which, we think, differs not, otherwise than in being constantly of a much darker hue than the ordinary *D. Plicatus* of India.

(1078) *Nycticejus ornatus*, Blyth, n. s. A large and robustly formed typical species, of uncommon beauty. In colouring, it is affined to *N. Tickelli*, Blyth, p. 157. ante; but is altogether stronger, with conspicuously larger and stronger feet, and remarkably elongated ears. It also does not possess the peculiar small flat incisor, situate posteriorly to the contact of the ordinary large upper incisor and the canine, seen in *N. Tickelli*. Colour, a bright pale rusty isabel-line-brown above, (the piles black for the basal

fourth, then whitish, with rusty extremities,) less vivid on the lower half of the back, and somewhat paler below, a pure silky white spot on the centre of the forehead, others on each shoulder and axilla above, and a narrow stripe of the same along the middle of the back; face below the forehead deep brown, including the chin; a broad white demi-collar over the throat from ear to ear; and beneath this is a dark brown demi-collar of similar extent, (passing in a narrow streak upward to the chin), and below this again a narrower pure silk white one, commencing from the shoulders—which below it are again deep brown, continued round to separate the ends of the white band below from the white axillary spot above. Membranes marked as in *N. Tickelli*, or black except the interfemoral which is tawny-red, as also a portion of the lateral membranes towards the body, and the entire limbs and digits. Ear-conch elongate oval, erect, with tragus a fourth of its length, narrow, semi-lunate, and curved to the front. Length (of an adult female)  $4\frac{3}{4}$  in. of which the tail measures  $1\frac{7}{8}$  in.; expanse  $14\frac{1}{2}$  in.; fore-arm  $2\frac{1}{4}$  in.; longest finger  $3\frac{7}{8}$ ; tibia  $\frac{7}{8}$  in.; foot with claws  $\frac{1}{2}$  in.; ears externally  $\frac{5}{8}$  in.; tragus  $\frac{1}{4}$  inch. Procured at Cherra Punji.

(1079) *Talpa Leucura*, Blyth, J. A. S. XIX, 215. Of this recently described species, Mr. Frith has brought thirty-three specimens in spirit, all true to the distinctive characters indicated. In none does the head and body exceed  $4\frac{1}{2}$  inches in length. The species, however, inhabits the plain of Sylhet, and not Cherra Punji as formerly stated.

(1080) *Sorex Peyroletii* (?), Duvernoy. The specimen examined, had been affixed to a thorn by some shrike, as has been several times observed of the common British Shrew by *Lanius Collurio*. Colour darker than usual; but otherwise it appears identical with specimens from various parts, as Almorah, S. India, Maulmein, &c. It is the smallest of all known mammalia.

(1081) *Tupaia Ferruginea*, var. *Belangeri*; *Tupaia de Pegu*, Lesson, Zool. de Belanger, t. 4. *Cladobatus Belangeri*, Wagner.

This race, which abounds in Arakan and the Tenasserim provinces, merely differs from the common *T. Ferruginea*, Raffles, of the Malayan peninsula, in being less deeply tinged (and often not at all so) with maroon on the upper-parts; the colouring being much as in *T. Javanica*, but still having a decided rufous cast as compared with this little species, which likewise is common about Malacca and Singapore, though unnoticed in Dr. Cantor's list of the mammalia of the Malayan peninsula. We cannot regard *T. Belangeri* as distinct from *T. Ferruginea*; and we have not previously seen it from so northern a locality as Cherra Punji, though it probably also inhabits Assam. The species of Central and Southern India, *T. Elliotti*, Waterhouse, is a

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much larger animal, equal in size to *T. Tana* (*V. Cladobates Speciosus*, Wagner), of the Archipelago and the only remaining species of this genus hitherto discovered is the strongly marked *T. Murina*, (Diard), from the western coast of Borneo figured by Dr. S. Muller and M. Temminck.

(1082) *Rhizomys Pruinus*, Blyth, n. s. So far as can be judged from external characters, this quite resembles *Rh. Badus*, Hodgson, of the vicinity of Darjiling, and *Rh. Castaneus*, Blyth J. A. S. XII. 1007, of Arakan, except in being very differently coloured: the fur being uniformly dusky-slate above and below, with hoary tips, which latter are of somewhat coarser texture; on the belly there is a slight silvery shade. All three differ from *Rh. Sumatrensis* (*V. cinereus*, McClelland,) of the Teasserim provinces and Malayan peninsula, in being much less robust, having a much shorter tail, and a dense coat of fine soft fur instead of a thin coat of bristly fur; but their structural characters are essentially the same. An example of the present race was long ago forwarded to the Bengal Asiatic Society from Cherra Punji by F. Skipwith, Esq., C.S., but we deferred describing it until seeing additional specimens. Mr. Skipwith's specimen having old and faded fur is much browner and less slaty than those obtained by Mr. Frith in newly renovated pelage; but the hoary tips are conspicuous in all. It is extremely common at Cherra Punji.

(1083) *Atherura Macroura*? (L.; nec *Hystrix fasciculata*, Shaw). *Hystrix spicifera*, Buch. Ham. MS. The different Asiatic species of this genus remain to be fully discriminated. Mr. Waterhouse refers the Siamese race, with a terminal tail-tuft of "long flattened bristles (somewhat resembling thin and narrow strips of whale bone)," to *Hystrix fasciculata*, Shaw (*V. H. macroura*, Gervais), and he states this to inhabit "Siam and the Malayan peninsula." It is doubtless the species figured, evidently from life, by Gen. Hardwicke: but, if inhabiting the Malayan peninsula, it must co-exist there with *Ath. Macroura*, (L.), apud Waterhouse, which has "the apex of the tail provided with a large tuft of flat bristles, which are spirally twisted, and alternately contracted and expanded." This Mr. Waterhouse gives doubtfully from Sumatra; and it is certainly the common brush-tailed Porcupine of the Malayan peninsula. In the Chittagong, Tippera, and Khasya hills; there is a very similar race to the last, but with the spines shorter and less coarse, excepting those of the croup, the ensemble of the colouring greyer, and the enamel of the front-teeth pale yellow instead of deep buff or orange-yellow. On minute comparison of the skulls, the frontals of the Malayan race are seen to be somewhat larger and more convex, while the parietals are proportionally smaller, than in the Northern race: the palatal foramen, also, is narrower and advances more forward in the

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former, and the inferior lateral process of the superior maxillary, forming the lower border of the great antorbital foramen, is, in the Malayan race, given off anteriorly to the position of the first molar, while in the Northern race it abuts directly on the first molar. If distinct, it should bear the name *Spicigera* given to it by Buchanan Hamilton, who has excellently figured and prepared a good M.S. description of it, founded on a living pair received from Chittagong. "They were brought," he was informed, "from the hills; and, so far as the donor (Mr. Macrae) understands, their habits are pretty much the same as those of the Porcupine of the plains. Both burrow in the earth, live upon roots, and are found either in pairs or families." A specimen brought from Cherra Punji by Mr. Frith corresponds exactly with Buchanan Hamilton's coloured figure.

(1084) MAMMALIA OF THE HIMALAYAS, by WM. OGILBY, Esq., M. A., *Fellow of the Royal Astronomical, Geological, Linnean, and Statistical Societies; Secretary of the Zoological Society in Madras Journal of Lit. and Science, July 1840.*

The Zoology, like the Botany of the Hills, differs essentially from that of the sultry plains of India, which skirt their southern base; though occasionally mixed with tropical forms, it is upon the whole of a character closely resembling that of the more temperate and northern latitudes; and the insulated position of these remarkable mountains, exhibiting, as they do, the rare and interesting phenomenon of a temperate and even a boreal climate on the very confines of the tropic, where the summer heat is necessarily greater than even under the equator itself, are of importance to inquiries connected with the geographical distribution of Animal Life. The principle of animality, possesses an innate power of adaptation which renders Animals in some measure independent of climate, particularly as compared with Vegetables, and which increases in proportion as we ascend in the scale of life. The power which all animals possess, in a greater or less degree, of adapting themselves to different varieties of climate, and of withstanding, uninjured, the effects of temperatures foreign to their natural habits, increases in proportion as we ascend from the lower to the higher tribes, and it will be seen that the Mammalia form one of the most favourable groups for the discussion of this important question. Indeed, were it not from their limited powers of locomotion, they would be the very worst of all, because their high position in the scale of life, and the superior intelligence and resource with which it endows them necessarily protect them against changes and casualties, which would prove fatal to more simply organized beings; but, deprived of the powers of flight, ordinary Mammals have not the means of traversing the wide deserts and



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oceans, which separate the habitable portions of the earth : the nature of their locomotive powers consequently confines them to particular regions ; and, in spite of the more favourable circumstances of their physical organization, their more varied resource and superior intelligence, they afford better materials for studying the problem of geographical distribution, than the kindred class of Birds, whose faculty of rapid flight enable them to set oceans and deserts equally at defiance, in passing to the most distant quarters of the globe, and, as it were, to choose their own temperature and climate in the boundless fields of air. Hence it is that the circumstances of the important problem of geographical distribution are less favourably presented in Ornithology than in Mammalogy ; but, with this exception, the observation above made holds good throughout all other classes of animals, and the simplest tribes will always be found to present the most certain results. Insulated families also occasionally occur, which possess peculiar advantages for the prosecution of this inquiry ; as, for instance, in the case of fresh-water Fishes, than which I am acquainted with no other group of animals so well calculated to illustrate the laws of geographical distribution, or so likely to repay a careful study under this point of view ; and I am only surprised that no competent Ichthyologist has hitherto occupied himself with so promising an inquiry.

The only other principle which can well be regarded as influencing the geographical distribution of Animals, viz. the dispersion of Plants, upon which all animals live, either mediately or immediately, is obviously subordinate to that of climate, with which it has been shown to be most intimately connected. On a limited scale the distribution of particular species may be seriously affected by the influence which civilization and cultivation produce upon the face of particular countries ; wild animals necessarily disappear with the woods and forests which afforded them food and shelter ; the Wolf, the Bear, and the Beaver, have thus disappeared from Britain ; the Capercalzie, exterminated above a century ago, is once more spreading rapidly over the pine forests of Scotland ; but these are partial cases, which do not bear upon the general problem of geographical distribution ; and it is obvious, that upon the great theatre of nature, climate and temperature are the only laws which regulate it, limited, indeed, by the physical structure of the animals, as has been already observed, and by their powers of transporting themselves to distant regions. Hence it is that terrestrial and fresh-water tribes are more favourable for this study than marine or pelagic ; though even among the latter, the comparative simplicity of their structure, and their consequent susceptibility of changes in temperature, render the habits of different genera and species more definite and confined than might otherwise be expected. Of the former, again,

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land and fresh-water Mollusks being among the most simply organized, are consequently most limited in point of range ; the species of Insects are almost equally confined, unless in the case of certain tribes, which are susceptible of being transported to distant countries in wood and other extraneous substances ; next follow Reptiles and fresh-water Fishes ; and, last of all, Birds and Mammals ; the former, as already observed, having an almost unlimited range of habitat, from the facilities which they derive from their powers of flight, of passing to the most distant quarters of the globe. The common Sparrow, the Snipe, and the Woodcock, for instance, are found in the Himalayas and in Japan, as well as in the North of Europe ; nature has endowed these birds with means of traversing the arid climes and extensive deserts which intervene between these localities, which she has denied to Quadrupeds ; and hence we must not expect to find the Badger and the Fox so widely distributed as the Owl and the wild Goose. But if the same species of Mammals are confined to particular regions, the great question still remains, whether similar regions, wherever situated, or however separated from one another by intervening seas and deserts, produce kindred or analogous species of Mammals ? and it is the general solution of this question in the affirmative, as far at least as the great continents of the globe are concerned, which renders the Mammalogy of the Himalayas so interesting in this point of a view. We have here an insulated territory on the confines of the tropic, with a climate varying from the most intense heats of the Equator to the greatest rigours of the pole ; and we shall find, in discussing its animal inhabitants, that it presents, as it were, an epitome of the Mammalogy of the world ; an intermixture, or rather a succession of species and genera similar to that which we meet in travelling from India to Kamtschatka, or from Brazil to Labrador. With all the resources at my command, I have found my materials much too limited to give any thing beyond a mere outline of the Mammalogy of the Himalayas. The main points to be attended to and noted down by inquirers and those, unfortunately, which the generality of observers most neglect, are the habits and economy of the animals which fall under their notice ; their manners, whether aquatic, arborial or terrestrial ; whether they inhabit burrows, or reside among thick jungle, or on the naked open plain ; whether they live in society or solitary ; the number of young which they produce at a birth ; their period of gestation ; the duration of life ; their instincts, and the stratagems which they employ to capture their prey or to escape from their enemies ; the nature of their food ; whether they hibernate or migrate from place to place, according to the season ; whether they are turned to any account by the natives, or are capable of civilizing.

pliable to the purposes of commerce or domestic economy. These, and other similar inquiries, of the utmost importance to the philosophical Zoologist, are within the ordinary range of daily observation to most gentlemen in India, with respect to many rare and interesting animals. I shall now proceed to enumerate such Mammals as I know to inhabit the great Himalayan Chain; and without following any formal arrangement, shall throw them into such natural groups or families, as appear best suited to illustrate their geographical distribution with respect to climate and temperature, the principal object of the present Memoir.

## QUADRUMANA.

(1085) *Semnopithecus entellus*. Throughout Bengal and the northern provinces of British India there appear to be only two species of *Simice*, the Hoomman (*Semnopithecus entellus*), and the Bhander (*Papio Rhesus*); both of which ascend the hills to a very considerable elevation during the summer heats, and return again to the plains at the commencement of the cold season. This migration is a very interesting fact in the history of these *Simice*; it is the only instance of a similar phenomenon, which has been recorded of this family of Mammals, and may become of great value in its application to geological reasoning on the climate and temperature of Europe during the tertiary epochs, in the deposits of which periods the bones of Apes and Monkeys have lately been found, associated with the remains of Pachydermata, and other inhabitants of more tropical latitudes. The Hoomman, called *Lungoor* by the Hill tribes, is not unfrequently found at an elevation of from 9,000 to 11,000 feet as among the Pine forests in the neighbourhood of Choor, and sometimes even at the verge of the snow-line. Nay, it even appears to have succeeded in crossing the mountains; Turner mentions having seen a large troop of these monkeys in Bootan, where they are held in the same veneration as in Hindustan; and that it has found its way, and is capable of subsisting in a state of nature, of a considerable elevation, and a comparatively low temperature, is sufficiently evinced by these facts, as well as by the testimony of Fraser, Traill and other intelligent travellers. Dr. Royle found it common enough in the neighbourhood of Hurdwar in April, and on Tuen and Mauma at 9,000 feet of elevation in the latter end of May and in June.—*Ogilby, M. L. J. July 1840, p. 147.*

(1086) *Papio rhesus*. The Bhander, Bender, or Bandar, the Common Monkey of Bengal and Upper India (*Papio rhesus*), though said by Mr Hodgson to exist in the central regions of Nepal, only in the vicinity of the temples, and in a semi-domestic state, whence he conjectures it to have been introduced from religious motives, is also reported to abound in Kumaon; and it is highly probable, that the nearly allied species, viz.

(1087) *Papio Assamensis*, lately discovered by Mr. McClelland in Assam, ascends the more eastern hills, as its congener does the central and western ranges. Of this, however, we have no positive knowledge, though the close affinity of the animals gives a strong degree of probability to the fact; but the various species of Monkeys which Mr. Fraser thinks may be found along the upper courses of the Jumna and Ganges, rest on more questionable authority; and it is not unlikely that this intelligent traveller, as indeed he has himself conjectured, was deceived by distance, variety of size, and other circumstances, which give a very different appearance to individuals of the same species.—*Ogilby, M. L. J. July 1840, page 145.*

(1088) *Cercopithecus radiatus*. Mr. Hodgson gives the Bonnet Monkey (*Cercopithecus radiatus*) as a native of Nepal; but this species is confined, as far as at present known, to the peninsula and western coast of India, and seems to have been confounded by Mr. H. with the *Papio Rhesus*, or Bhander of Hindustan.—*Ogilby, M. L. J. July 1840, page 145.*

(1089) *Hylobates Scyritus*? Mr. Hodgson in a letter to the Zoological Society, written some years ago, mentions that his shooters were once alarmed in the Kachar, or Alpine regions of Nepal, by the appearance of a wild man, which walked erect, was covered with long dark hair, and had no tail. The improbability of finding a real Ape in such a situation led him to question the truth of the report; but it is well known that the woods of the lower ranges to the east of Nepal contain at least one species of Gibbon, *Hylobates Scyritus*, called *Hooloo* or *Hooloc* by the Assamese; and it is not improbable that individuals may occasionally wander to the higher and more remote forests of the Central Hills.—*Ogilby, M. L. J. July 1840, page 146.*

## CHEIROPTERA.

When it is recollected that of the sixteen species of Bats, now known to inhabit the British islands, no fewer than ten have been discovered within the last few years, it will not appear surprising that we should be so imperfectly acquainted with this department of Himalayan Mammalogy. Mr. Hodgson, indeed, is the only author who has furnished us with any details on the subject: his "Synopsis of the Vespertilionidæ of Nepal," published in the Journal of the Asiatic Society of Bengal, vol. iv. p. 499, contains an enumeration of seven species of *Cheiroptera*; but, as he himself very candidly observes, his specific identifications must be received with considerable caution, from his want of access to extensive libraries and museums, for the purpose of comparison. Of the two species of *Pteropus*, for instance, which he has there briefly described under the names of *P. leucocephalus* and *P. pyrrivorus*, the former does not appear to differ from the *P. Medius* or *Edwardsii* of the Plains,



and the probability of its identity with that species is increased by the fact, which Mr. Hodgson mentions, of its only visiting the temperate regions of Nepal during the autumn, returning of course to the more sultry plains of India on the approach of the cold season.

(1090) *Pteropus rubicollis* of Mr. McClelland's "list of objects of Natural History collected in Assam," is likewise identical with the *P. Edwardsii*.

(1091) *Pteropus Dussumieri*. The only other species of tailless *Pteropus* known to inhabit the continent of India, *Pteropus Dussumieri*, is very different in its characters from *Pteropus medius*; and as Dr. Royle brought undoubted specimens of this latter species from the lower hills a little farther west, it is but reasonable to suppose that it is equally common in Nepal, and consequently identical with Mr. Hodgson's animal.

(1092) *Pteropus pyrrhorus*, to judge from the short description given by Mr. Hodgson, appears to be less questionably a new species: it belongs to the second section of the genus, having a short tail, partly free and partly enveloped in the membrane, and derives its specific name from the depredations which it commits among the ripe pears in the central regions of Nepal. The migratory habits ascribed to these *Pteropi* are common to the *Pteropus poliocephalus* of New South Wales, and many other species of the same genus; for these large frugivorous *Cheiroptera* are essentially tropical in their habitats, and only visit more temperate climates during the summer and autumn heats, when the ripe fruits tempt them to wander from their native regions. They are consequently but occasional visitors to the higher elevations and latitudes of the globe; and the *Pteropus dasymallus* and *Pteropus pteropus*, which have been hitherto observed only in Japan, comparatively a high latitude for these animals, do not probably form an exception to the general law.

(1093) Of the *Insectivorous Cheiroptera*, a family far more abundantly and extensively dispersed over the surface of the globe, Mr. Hodgson indicates only five species as natives of Nepal. Three of these are described as *Vespertiliones*, by the specific names of *V. Formosa*, *V. Puliginosa*, and *V. labiata*, and two as *Rhinolophi*, by the names of *Rh. armiger* and *Rh. tragatus* respectively; but without a more careful examination and comparison with other species than Mr. Hodgson had it in his power to make, it is impossible to say how far these Bats may be distinct from, or identical with, species already described. One thing at least is certain, that the temperate and more elevated regions of the Himalayas must contain many species of *Insectivorous Cheiroptera*, still unknown or undistinguished, besides those enumerated by Mr. Hodgson; it has been already observed, that this section of the family is very widely and generally distributed in temperate climates; and the rich harvest which has attend-

ed the researches of British naturalists, within the last few years, in their own country, ought to stimulate our Indian brethren to a pursuit which cannot fail to be rewarded by still more extensive discoveries. It would be extremely interesting, for example, to procure a complete series of Himalayan Bats, with the seasons, temperatures, and elevations at which they were captured carefully noted down, so as to compare them with analogous species of higher latitudes, and thus ascertain what law of succession the different forms may follow, or within what limits they may be confined in respect to temperature, in their geographical distribution over the surface of the earth. Speaking of these *Insectivorous Bats*, Mr. Hodgson observes that "they are neither migratory nor subject to hibernation;" two properties which in more northern climates would be considered incompatible with one another, and which even in the central regions of the Himalayas require a very careful revision before they can be admitted as established facts. I am not aware that these animals ever migrate in any climate; hibernation is the resource which nature has provided to preserve them during the season when their natural food disappears; and it is the general opinion, that within the tropics, the Insect-feeding Bats go to sleep at certain seasons, as they do throughout the winter in more northern latitudes: should the fact be otherwise, it would prove a highly interesting addition to our knowledge of their habits; but it is possible that Mr. Hodgson may have been led into error, by the casual appearance of a few individuals during an occasional fine evening, as sometimes occurs in Britain even in the depth of winter. The subject is well worth the attention of Indian Zoologists.

(1094) *Insectivora*. Ascending gradually from the *frugivorous Cheiroptera* of the Plains of India, which visit the hills only during the summer heats, through the insectivorous genera of the same family, which remain throughout the whole year, we next come to the *Insectivora*, properly so called; a family which belongs almost exclusively to the temperate regions of the earth; and of which it is therefore extremely interesting to find the common forms of Europe and Northern Asia occurring in the analogous climates of the Himalayas. No fewer than three distinct species of Hedgehogs, for instance, have been described from the Western Hills of the Himalayas.—*Ogilby, M. L. J. July 1840, p. 148.*

(1095) *Erinaceus spatangus*, a small dark-coloured species, not more than twice the size of a large mouse;

(1096) *Erinaceus Grayii*, of a grizzled black and yellow, from the spines being annulated with these two colours, rather smaller than the common European species; and

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(1097) *Erinaceus collaris*, by some supposed to be identical with *E. Grayii*, but easily distinguished by a white collar half surrounding the neck. All these species, however, require a careful revision; they are founded on single specimens, those of the two former deposited in the Zoological Society's Collection, that of the last in the British Museum, and of which a figure is published in the Indian Zoology of Messrs. Hardwicke and Gray. It is possible that more extensive and accurate observation may prove the whole three to be identical: at all events, it is certain that one, or either of these, of a different species (*Erinaceus indicus* of Royle's Illustrations, &c. p. 6.), inhabits the neighbourhood of Delhi, where it would be interesting to observe the phenomena attending its hibernation, such as the temperature of its body, the nature of its respiration, &c. during the period of repose.—*Ogilby, M. L. J. July 1840, p. 148.*

(1098) *Sorex indicus*. Mr. Hodgson, in the letter to the Zoological Society, already referred to, denies that there are any Hedgehogs in Nepal, but mentions a small dull slaty-blue variety of the common Indian Shrew or Musk Rat (*Sorex indicus*), as common in the lower and central regions, to which he speaks of it as being confined. Other species no doubt exist in the more temperate parts of the mountains, though their small size and shy habits screen them from observation.—*Ogilby, M. L. J. July, 1840, page 148.*

(1099) *Talpa* the same gentleman mentions the Mole (*Talpa*), as abounding in the Kachar, or northern region of Nepal, and Traill says it is common in Kemaon; but no one appears to have described, or even examined it, and we are ignorant of every thing relating to it, except the name. It will probably prove to be a distinct species from its European congener, if it exist at all; but the question is involved in great doubt, and is well worthy of a careful examination.—*Ogilby, M. L. J. July 1840, page 148.*

### CARNIVORA PLANTIGRADA.

(1100) *Ursus*. Of the family *Carnivora Plantigrada*, the majority of which likewise belong to the temperate regions of the earth, various forms and species occur among the Himalayas. First of the genus *Ursus*, we have the *Bhalo*, or Common Bear of India (*Ursus labiatus*), and, according to Mr. Hodgson, the Malay Bear (*Ursus Malayanus*), inhabiting the Turais, or sultry regions, at the base of the mountains, to which localities he appears to intimate that they are confined. But the habitat here assigned to the Malay Bear is extremely doubtful. It rests solely on the authority of Mr. Hodgson, who, from the want of proper means of comparison, is often mistaken in the identification of species: moreover, we have never received this animal from any part of Continental India, but only from the great islands of the Indian Archipelago; and it is therefore not improbable that it may have

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been in this instance confounded with the *Ursus Thibetanus*, which, from the general similarity of the two species, may have readily happened. Mr. Hodgson, indeed, expressly mentions this latter species as an inhabitant of the Central and Northern regions of Nepal; and Dr. Royle informs me, that it is confined among the more western hills, to the Doon and warm valleys, where it is called *Reech* by the natives. Lieut. T. Smith, of the 15th regiment N. I., however, an officer well acquainted with the Mammals of the Himalayas, and a keen sportsman, assures me that the Common Sloth Bear (*Ursus labiatus*) does not ascend above the lower spurs of the great Mountain Chain of Northern India; that it is there replaced by the *Reech* which occupies the whole of the more elevated hills, as far up as the snow line, where it is succeeded in its turn by the *Parji* or yellow Bear (*Ursus isabellinus*), a species hitherto very imperfectly described, though mentioned by every tourist as extremely abundant in the higher regions of the Himalayas. Capt. Skinner met with it in the neighbourhood of Bhairo Ghati; Traill found it in Kemaon, though he says it is peculiar to Bhot; and it is probably the Brown Bear mentioned by Mr. Fraser: so that upon the whole it appears, that whilst the Common Sloth Bear (*Ursus labiatus*) is on all hands admitted to be confined to the sultry plains of India, the *Reech* (*Ursus thibetanus*) succeeds it, as the legitimate representative of the European Bear (*Ursus Arctos*), and of its American analogue (*Ursus americanus*), in the middle or temperate regions of the hills, to be itself replaced among the frozen peaks of the higher mountains, by the *Parji*, or Yellow Bear of the Himalayas (*Ursus isabellinus*), a species in all respects analogous, in its colour and habitat, as well as in its decidedly carnivorous appetite, to its congener, the Polar or Sea Bear of the North (*Ursus maritimus*.)

(1101) *Gulo* and *Meles*. Various animals, either belonging or closely allied to the Gluttons and Badgers (*Gulo* and *Meles*), pre-eminently northern forms, likewise inhabit the elevated ranges of the Himalayas. Among the lower terraces we have the

(1102) *Rattelus mellivorous*, Ratel, called *Peejoo* by the Hindoos, which is common over all the plains of Northern India, and differs from the same animal, as found at the Cape of Good Hope, only in being of a lighter colour on the back.

This wide distribution of the *Carnivori* and the common occurrence of the same species in India, and the most remote parts of Africa, will be more particularly mentioned in the following article: Mr. Hodgson, under the erroneous impression that the *Peejoo*, which the Nepalese call *Bharsiah*, was an unknown animal, and evidently misled by some imperfect or faulty account of its dentition, has recently described it as a new genus under the name of *Ursitæus inauri-*



*tus* ; but the species has long been well known in Europe. M. F. Cuvier figured, and accurately described its teeth in the "Dents des Mammiferes," so long ago as the year 1825 ; and the late Mr. Bennet described and figured the animal itself in 1880, from an Indian specimen then living in the menagerie of the Zoological Society.

(1103) The *Balloo-soor* (perhaps more properly *Bhalloo-soor* ?), *Meles collaris*, which M. F. Cuvier likewise elevated to the rank of a generic form, under the name of *Arctonyx*, upon the faith of a distorted native drawing sent to him by M. Duvaucel, is a real *Badger*, and was described and figured by the celebrated Bewick, at least thirty years before M. Duvaucel's visit to India. It inhabits the northern plains of Hindostan, and probably ascends the hills, but of this fact I have no certain information.

(1104) *Gulo*. Of the Gluttons, properly so called, the *Gulo nepalensis* of Mr. Hodgson, which does not differ specifically from the *Gulo orientalis* of Dr. Horsfield, the only distinction being in a lighter shade of ground colour, inhabits the lower terraces of the hills ; whilst the

(1105) *Wah* or *Chitwah* (*Aturus fulgens*) and the

(1106) *Benturong* (*Arctitis Albifrons*), are said to be confined to the Kachar, and regions bordering on the snow-line. As regards the *Wah*, there is no doubt about the truth of the habitat here assigned to it ; but the *Benturong* is a native of the Indian Archipelago, and of the Peninsula of Malacca ; and I strongly suspect, that it has been confounded with some other animal, perhaps with *Paradoxurus bondar* or some closely allied species. The habitat of *Bootan*, assigned to it in the *Regne Animal*, is altogether erroneous.

Messrs. Gray and Isidore Geoffroy have proposed to consider the *Gulo nepalensis* as the type of a new genus, the former under the name of *Helictis moschata*, the latter under that of *Melogale personata*.

(1107) *Carnivora Digitigrada*. It was mentioned incidentally in the preceding article, that many species of *Carnivora* were common to India, and the Continent of Africa ; and it is not a little singular, that this migration appears to have proceeded exclusively from west to east, and never in the opposite direction ; or, in other words, that whilst the *Carnivora* of Africa have found their way freely into the neighbouring Continent, those of India have never passed the Arabian desert. I do not pretend to account for this. Perhaps it may depend upon the physical character of the two Continents, and the influence which this circumstance exerts in modifying the nature and habits of their respective inhabitants. The Lion of the burning Sahara, for instance, like the wild Taurick or Bedoween of the same regions, would find the parched deserts of Syria and Persia no barrier to his progress towards the East ; whilst, on the other hand,

the Tiger of the moist jungles of Bengal could no more pass the arid plains of Arabia than the puny and luxurious Hindoo, accustomed to the same humid soil and atmosphere. But whatever may be its cause, the fact itself is as undoubted as it is interesting. The common distribution of the *Ratel* over both Continents has been already mentioned. This animal is spread over the whole of Africa ; it is common in every part of the Cape colony, and Denham and Clapperton brought it from Bornou ; and though its geographical limits have not been accurately ascertained in Asia, we know that it abounds on the plains of Northern India, which do not differ much in the physical structure from the Karroos of South Africa. So likewise the Lion (*Felis Leo*), the Leopard or Panther, for they are both the same species (*Felis-Pardus* and *Leopardus*), the Cheetah (*Felis jubata*) the Persian and Red-eared Lynxes (*Felis Caracal* and *Felis Chaus*), the striped Hyæna (*Hyæna virgata*), and the Jackal (*Canis-aureus*), all pre-eminently African species, are found in most parts of India, without offering any striking variety either in form or colour ; whilst the Tigers, Wolves, Paradoxures, &c. of the latter country have never passed far to the west of the Indus, and some of these are even without generic representation on the Continent of Africa ; nor is it less singular that, as far at least as at present known, this migration should have been confined to the *Carnivora*. There is not a single authenticated instance of any of the numerous Antelopes in which Africa abounds above all other parts of the world, and which nature has peculiarly adapted to inhabit the most parched and arid deserts, having crossed the Isthmus of Suez, any more than of the various species of Deer so common throughout the whole extent of Asia having migrated in an opposite direction. If the various indications which Mr. Hodgson has given of the occurrence of species known to inhabit the great islands of the Indian Archipelago, and the southern extremity of the Malay Peninsula, such as the *Benturong* (*Arctitis albifrons*), the Malay Bear (*Ursus malayanus*), and the Javanese Ichneumon (*Herpestes javanica*), in the forests of the Turai, which skirt the southern foot of the Himalayas, should turn out to be correct, (and it is certain that *Felis minuta* and *Gulo orientalis* are common to both these localities), it would appear that India Proper, besides its own appropriate Mammals, is a kind of neutral ground upon which the species of the most distant countries to the east and west of it meet and mingle together. One fact, abundantly singular, but which I have never seen accounted for, is the alleged total absence of every species of the genus *Canis*, so numerous and so common throughout all parts of India, in Burma, Siam, and those other countries east of the Brahmapootra, which compose the great Malay

Peninsula. This is a phenomenon well worth the attention of Indian Naturalists.

(1108) *Felis*. As far as regards the occurrence of the *Digitigrade Carnivora* among the Himalayan Mountains, it is certain that the Lion called *Pany* by the Indians, ascends the western hills to a very considerable elevation. Mr. Fraser often heard of it during his journey to the sources of the Ganges and Jumna, and Bernier, [Dr. Royle says here, "I frequently made inquiries on this subject, and could never learn anything positive on the subject; nor had any of the numerous sportsmen to whom I spoke on the subject, ever seen a Lion or its skin, obtained from within the Himalayas. At present, the Lion is I believe only found to the west of the Jumna, especially on the edge of the desert, near Hansi. J. F. R." whilst travelling to Cashmere, in the train of Aurungzebe, had frequent opportunities of witnessing the chase of this animal: the amusement was reserved for the Emperor alone, and the success of a day's sport was recorded by the Imperial Historiographer in the annals of the empire. The same indifference to climate characterises the Lion in Africa; in the time of Herodotus and Aristotle, he was common among the coldest mountains of Macedon; at the present day he is as often found among the snowy peaks of the Atlas, or on the chilly slopes of the Schneeberg, as in the desert of Barca, or on the banks of the Gareip. Travellers should look for him to the east of the Brahmapootra, as though not known to inhabit any part of Eastern India, the Burmese are said to have figures which can be intended for no other animal, and which can only have been drawn from the living model. The Tiger and Leopard are well known to inhabit every part of the Himalayas, even to the line of perpetual congelation: they exist equally in Japan, in the Caucasus, and in the Altai Mountains in Southern Siberia. The Tiger of Bokhara is less than the Bengal variety, and chiefly confined to the Valley of the Oxus; whilst in Japan he is covered with a thick coat of long soft fur, to protect him from the rigours of that northern climate. The *Cheetah* is said by Mr. Hodgson to occur chiefly among the lower valleys of the Himalayas, but Pallas found it as far north as the Caspian Sea and the deserts of the Khirgis Tartars, so that it may possibly ascend the Hills to a greater height than has yet been suspected. Lieut. Smith mentions a small dark coloured variety of the Leopard, called *Luckur-backer*, extremely fierce, and common in every part of the Hills.

Among the smaller species of the genus *Felis*, the Moormi Cat (*Felis moormansis*) first described by Mr. Hodgson, and hitherto observed only by that gentleman, as likewise the *Felis Bengalensis* or *nepalensis*, are stated to inhabit the middle terraces of Nepal. The *Felis Viverrinus*, first described by Mr. Bennett in 1822, and three years

afterwards by Mr. Hodgson, under the nearly identical name of *Felis Viverriceps*, inhabits the lower terraces and valleys of the Turai *Felis Chaus* (called Biraloo in Nepal), of which I have compared numerous African and Indian specimens, extends over every part of the Hills: it is the *Felis erythrotus* of Mr. Hodgson; and there is a specimen of a Himalayan Cat in the Museum of the Zoological Society, so closely resembling the common Wild Cat of Europe, that it differs only in the absence of the dark transverse and longitudinal stripes which mark that species, and which may not improbably be a mere effect of locality.

(1109) *Paradoxurus*. Mr. Hodgson has described three species of *Paradoxurus* as inhabitants of the Southern, Central, and Northern regions of Nepal respectively, two of which at least I have seen from the more Western Hills; *P. Bondar* (*P. hirsutus*, Hodg.) is confined to the Turai; *P. nepalensis*, Hodg., frequents the middle ranges of the mountains, and *P. larvatus*, (*P. lanigerus*; Hodg.) is only found in the higher regions.

(1110) *Herpestes* two species of Mongoose (*Herpestes*) likewise inhabit the lower terraces; *H. griseus*, called Nyool in Nepal, does not extend beyond the Turai, but *H. Edwardsii* (*H. auropunctata*, Hodg.) ascends the central hills; whilst *Vicerra Rasse* and *indica* and *Vicerra Zibetta* are said to frequent the same localities respectively.

(1111) *Mustelæ*, the true *Mustelæ*, a genus proper to more northern latitudes, abound in the Himalayas, where there appear to be many different species, some of which, according to Mr. Hodgson, differ but little from those of Northern Europe and Asia. It is to be remarked, however, that they have never been properly compared; but it is interesting to find this additional instance of the relation between generic forms and climate.

(1112) In the central region, besides *Mustela flavigula*, Mr. Hodgson mentions two closely allied species, one larger and of a fuller habit of body (query, *Paradoxurus larvatus*?); the other, which he has described under the name of *Mustela Kathiah*, is much smaller, and often domesticated by the Nepalese for the purpose of destroying vermin, and sometimes even large animals. This appears to be the *Kukar* of Kemaon, where it likewise frequents the villages, burrows in the walls of houses, and is similarly protected by the inhabitants.

(1113) The *Mustela lanigera* of Mr. Hodgson resembles the common Weasel of Europe, but differs in its spirally twisted hair; and the same gentleman mentioned another species so nearly approaching our common Pole-cat, that he is unable to perceive any specific difference; however it will probably turn out to be distinct.



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Both these latter species abound in the northern and central regions.

(1114) *Lutra*. No fewer than seven species of Otters are said by Mr. Hodgson to inhabit the Himalayas; but they require to be carefully studied and compared, before we can venture to pronounce definitely upon their specific distinction. It is certain, indeed, that several species do actually exist in these Hills; Mr. Hodgson has himself given brief characters of four which he regards as new, besides the two common species of the plains, (*Lutrae Nair* and *Leptonyx*), and seems to intimate that the seventh may be no more than a variety of the common European Otter. The following is the substance of Mr. Hodgson's observations in the letter already referred to, and I give them at length in the hope that they may induce other observers to co-operate with that gentleman in filling up the sketch of which he has given an outline. "Of *Lutrae* we have seven species, five differing from the two usually found in the plains, as well as from all described species, except the common Otter (*L. vulgaris*), of which the largest Nepal species seems to be only a variety. It is five feet long, including the tail, and is the largest, though not the longest of our species. It is peculiar to the lower region, where also three other species inhabit: two more belong to the central, and one to the Kachar. One species is yellowish brown all over; the others brown, more or less dark, some having the chin and throat much paler than the rest of the body, and approaching nearly to white or yellow. They differ in length from five feet to one and a half feet; some being quite vermiform, and others as bulky as the Badger. Detailed descriptions, skulls, and skins of these animals, are much wanted."

(1115) *Canis*. Of the genus *Canis*, different species are found everywhere. The common Pariah Dog is universally dispersed through the mountains, but the Thibet Mastiff is confined to the Cachar, into which it is imported from its native country. There are many distinct varieties of the noble animal.

That called *Sassa*, a large black kind, with dew claws on the hind feet, is esteemed the finest; another called *Mustang* is of a bright red colour.

The common Wild Dog, called simply *Jungle Coota* in the Plains and *Buansu* in Nepal (*Canis Duckunensis* of Sykes and *C. primævus* of Hodgson) is only found in the lower regions, but is replaced farther up by two other wild species, likewise called *Jungle Coota* by English sportsmen. Lieut. Smith informs me that one of these is larger and the other smaller than the *Jungle Coota* of the Plains, from which they both differ in having shorter tails and a lighter or more ashy colour: both species ascend the Hills even to the snow line; they hunt in packs, and inhabit ravines and rocky dells; but, being excessively shy are not very often seen. The

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*Jungle Coota* of the Plains, in other respects, does not appear to me to differ from the *Canis Sumatrensis* of General Hardwick.

The *Kokree*, or small Indian fox (*Canis Corsac, Indicus, Bengalensis Kokree*, &c.); and the *Berria*, or wolf of India (*Canis pallipes*, Sykes), never ascend the Hills.

The Jackall (*Canis aureus*), is however occasionally said to be found in the central regions.

But the higher mountains are inhabited by a very beautiful species of Fox, which Dr. Royle first noticed as the Hill Fox, and of which he brought home the first skin ever seen in England, and which was described at the time in the present memoir, and afterwards in the proceedings of the Zoological Society, part iv. p. 103 by the name of *Canis Himalæicus*. Mr. Pearson then Curator of the Museum of the Asiatic Society at Calcutta, likewise described it about the same time as the latter; and as he had a few months priority in point of publication, his name of *Canis montana* must have the preference.

(1116) *H. Virgata*. The *Hyæna* of India, a native of the Plains, sometimes ascends even to Simla.

## RODENTIA.

The remark which was formerly made to account for our limited knowledge of the *Cheiroptera* and *Insectivora* of these mountains, may be applied with equal force to the present family; viz. that the comparatively diminutive size and timid habits of the animals which compose it screen them from general observation. Still we have much more detailed accounts of the Himalayan *Rodentia* than of either of the two former families, though even these are far from being so complete as could be wished.

The striped Squirrel of the plains (*S. palmarum*), is according to Mr. Hodgson, abundant in the lower hills of Nepal; and I have seen a second species (*Sciurus Lokriah*, Hodg.) of the same size, but of a uniform earthy brown colour, tipped with golden yellow, which is said to be an inhabitant of the central regions. Mr. Hodgson mentioned a third (*S. Lokroids*) similar to the latter, and perhaps not specifically distinct.

(1117) *Pteromys magnificus* and *P. alboniger*, Hodg. Two beautiful species of flying Squirrel are found both in the northern and central regions, but do not extend to the very elevated parts of the mountains. Here, however, are found a small brown kind of Marmot, called *Bhia* by the natives, hitherto undescribed; and an equally undescribed species of Rat, with a tail not more than half an inch in length, most probably a Lemming (*Georychus*, Illiger), if it be not rather a *Lagomys*, of which rare and essentially arctic genus Doctor Royle has brought a beautiful specimen from the Choor Mountain. Captain Herbert, in his tour up the Valley of the Sutlej met with this tailless rat at an elevation of 12,000 feet, and observes that the ground was every

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where cut up into groves by it in search of food. He conjectures the animal to be a species of *Spalax*, but Dr. Royle is rather disposed to think that it was no other than the *Lagomys*, as he observed the ground similarly cut up in the vicinity of the spot where he obtained his specimen. The circumstance of the tail, however, which, short as it is, is expressly mentioned by both Capt. Herbert and Mr. Traill, appears to me to preclude Dr. Royle's supposition, since the *Lagomys* of the Himalayas, like the rest of its congeners, is absolutely without any rudiment of this organ. It is not improbable, indeed, that species of all the three genera here mentioned may be found among the more elevated ridges of the Himalayas, of which the climate is perfectly adapted to their habits: and it is to be hoped that future observers will direct their attention to the elucidation of this, as well as the numerous other unsettled points of Himalayan Mammalogy, to which I have already been so frequently obliged to refer.

Dr. Falconer, in the report of his recent journey to Cashmere and Little Thibet, mentions a Rodent under the name of the Thibet Marmot, which he says was first found in a bleak and rocky tract of country, immediately after passing to the northern slope of the great Himalayan range; but we have no farther knowledge of its characters: however, this is precisely the locality in which Mammals of this description might naturally be expected to abound.

(1118) *Mus Rattus* and *M. decumanus*. Rats and Mice, differing little, if at all, from our common European species, are abundant in all the houses. Mr. Hodgson, indeed, expressly states that both our black and brown, or Norway rats, are the common species of Nepal, and Mr. Traill mentions them incidentally as inhabitants of the province of Kemaon. This is another interesting and important point of similarity between the Zoology of the Himalayas and that of the more northern parts of Europe and Asia; nor can we attribute the presence of these animals, in this part of the globe, to the introduction of European conquerors, as is well ascertained to have been the case in America and Australia, since they are confined to the mountains, and altogether unknown in the Plains of India, except perhaps in some of the largest seaports. They must consequently have travelled south to reach their present habitat; and, no doubt, exist in Thibet, Tartary, and other intermediate countries, where the climate is suitable, as far as Northern Asia, from which at least one of the species (*M. decumanus*) is said to have been originally introduced into Europe.

Besides these, Mr. Hodgson describes two other species (*Mus niviventur* and *M. nemorivagus*) as peculiar to the Himalayas;

And I have received a Rat from Dr. Royle, which in the dried state of the specimen I cannot

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distinguish from the common European Campagnol (*Arvicola vulgaris*), a fact the more interesting from this genus being confined to the temperate and colder regions of the Old World.

(1119) The *Bandicoot*, or great Rat of the Plains (*M. giganteus*) does not exist in Nepal; but various kinds of Field Mice, of what precise species is not mentioned, are stated to be sufficiently common.

(1120) The Porcupine (*Hystrix cristata* var. *leucurus*, Sykes) is found in Kemaon, and the lower and central regions of Nepal.

Mr. Hodgson mentions two species of Hares as inhabiting Nepal. One he calls the common small species (probably the black-necked Hare of F. Cuvier, '*Lepus nigricollis*'), which, he says, is confined to the Turai; the other, which he considers a new species, as large as the common English Hare and nearly resembling it, inhabits the higher and colder parts of the mountains. This is *probably* the red-tailed Hare of M. Isidore Geoffroy St. Hilaire, (*L. ruficaudatus*), of which Dr. Royle obtained a specimen at Hurdwar (?) and which, he informs me, is very common in the Doon and in the neighbourhood of Delhi. As M. Is. Geoffroy's short description of this species is necessarily imperfect, from the mutilated state of the only skin which he had an opportunity of examining, the following more detailed account will not be unacceptable to the scientific Zoologist:—

The skin obtained by Dr. Royle is that of a full-grown female; it is in perfect condition, and measures one foot ten inches from the nose to the origin of the tail: the ears are about five inches in length, and the tail four inches. The face, back and sides are regularly brindled or variegated with alternate wavy lines of black and light sandy brown, arising from the hairs on those parts being annulated with these two colours. The whole coat is short, smooth and glossy; it consists of a short fine internal fur, of a cotton texture, and pale bluish white colour, and of a long, coarse, external hair, which, as just observed, is annulated with black and light sandy brown, and gives the general colour to the upper parts of the body. In the distribution of these colours, each hair is divided into three equal parts, the top and bottom being black, and the centre light reddish brown. The dark colour predominates most on the face, hips, and along the median line of the back, but becomes gradually fainter upon the shoulders and flanks, and is separated from the pure white of the belly by a narrow band of pale rufous. The cheeks are grey, pointed or intermixed with black; a light grey spot occupies the space in front of each eye; the chin is also grey, and the moustaches long and stiff, black at the roots and grey at the points. The ears appear to be reddish brown tipped with black, but the hair has been partly rubbed off in the specimen described, which pre-



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vents me from speaking with certainty. The whole upper part of the neck is pure unmixed sandy red, the fur being of the same quality as the internal fur upon other parts of the body, and without any intermixture of the long external silky hairs. The outer face of the arms, the whole of the fore legs, and the outer face of the hind, are also red; the tail red, or rather reddish brown above, and pure white beneath; and the belly and under parts of the body unmixed white. The animal had probably been killed whilst suckling her young, as the skin exhibited four very large teats, one pair on the breast and the other on the abdomen. These were all I could observe, but there may have been more, as the skin had been a good deal rubbed about these parts.

(1121) *Lagomys Roylei*. But by far the most interesting and unexpected acquisition, which Dr. Royle's discoveries among the Himalayas has produced to the Zoologist, is a new and beautiful species of *Lagomys*, a genus heretofore only found in Northern Asia and among the rocky mountains in North America. This discovery, of the greatest importance to our inquiries into the principles which regulate the geographical distribution of animals, is entirely due to Dr. Royle, and furnishes another, and a most marked instance of the paramount influence of climate upon the dispersion of animals, as well as vegetables. Unfortunately, the only skin which Dr. Royle has brought to England, is too imperfect to admit of so detailed a description as would be desirable. The skull has been taken out, (it is now in the Museum of University College, and, Professor Grant informs me, exhibits the same form of dentition as the other species of *Lagomys* described by Drs. Pallas and Richardson), and the hind legs cut off, but in other respects it is in a sufficiently good state of preservation to enable me to assign its specific characters. I propose, under the specific denomination of *Lagomys Roylei*, to dedicate it to my friend Dr. Royle, in commemoration of the important service which that distinguished Botanist has rendered by its discovery to the kindred science of Zoology.

*L. Roylei* more nearly resembles the *Sulgan* (*L. pusillus*, Pallas), and the American species (*L. princeps*, Richardson), than either the *Pica* or *Ogotona* (*L. alpinus* and *Ogotona* of Pallas). With the exception of the *Pica*, however, it is considerably larger than any other species of *Lagomys*: the skin here described, notwithstanding its imperfect state - for the hinder parts have been partially mutilated, measuring eight and a half inches in length, which is more than one third as large again as the *Ogotona*, *Sulgan* or the American species. From the *Ogotona*, however, it is easily distinguished by its colours, which, in that species, are light grey above and pure white beneath as well as by its naked color.

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The triangular form of the ears in *L. pusillus*, prevents that animal from being confounded with any other species, and the *Pica* (*L. alpinus*), which alone approaches the size of *L. Roylei*, is at once distinguished by the sandy red colour of its fur. The *L. princeps* of Dr. Richardson is the only remaining species of the genus at present known; it is very similar to our animal in the colour and quality of the fur, but may be readily distinguished by its inferior size, and by the deep black hair which covers the external surface of its ears, and which is replaced in *L. Roylei* by long fur of a pure white colour.

The fur of this species is of two kinds, a very soft and fine internal one of a beautiful blue black over every part of the head and body, as well above as below, and a coarser external kind, of the same colour at the base, but afterwards marked with a broad ring of a greyish yellow colour, and finally tipped with dark brown. These two kinds of fur, however, are not produced by an actual difference in the individual hairs; on the contrary, the same hairs exhibit both the appearances here described, being extremely soft and fine at the root, and assuming a harsh and rigid structure towards the extremity. These harsh tips, being the only parts of the fur seen from without, give their general colour to the whole body. On the upper parts of the body, the head, back and sides, this is uniform brown, slightly mixed with yellowish grey, very dark on the back, much more so, for instance, than in the common Rat (*M. Decumanus*), but rather paler on the sides, and yellowish white on the belly; the hairs on this part wanting the harsh brown point, though in other respects perfectly similar to those of the back. The fur on the body is about an inch in length, and nearly as long on the head, which gives the face a rough shaggy appearance. The nose is entirely covered with short harsh hair of a uniform brown colour; the upper lip is bilobed as in the Hare; the ears are of an elliptical form with regularly rounded tops, covered internally with very short brown hair, and on the outside with long white hair at the base, and short brown at the top, the posterior edges having a scarcely perceptible narrow white border. They are about half an inch broad and three quarters of an inch in length, with a small internal lobe about a quarter of an inch long, and have the folding inwards of the anterior margin, and, consequently, the resulting funnel shape of their basal portions, which Pallas noticed in the species of Northern Asia. Dr. Richardson could observe nothing of this appearance in his *L. princeps*, but I presume this must have arisen from the imperfect state of his specimens in a part so liable to be injured, since an individual in the British Museum exhibits the structure too obviously to have otherwise escaped the notice of that accurate Zoologist. (The author of the

*Roylii* are nearly as long as the head and ears together, and of a uniform brown colour. The arms and fore-arms, and, I presume, the thighs and legs, for, as I have already observed, the posterior members are wanting in the specimen, are covered with fur of the same colour and quality as that on the body, only shorter; but the whole upper face of the carpus, and probably also of the tarsus, is covered with short adpressed hair of a bright reddish yellow colour. The soles of the fore feet present four naked tubercles, corresponding to the extremities of the toes, and a fifth, considerably farther back, which represents the heel, and is separated from the others by a space covered with very short brown hair. The thumb is situated behind the other toes, and, like them, has a small sharp claw of a dusky horn colour.

Dr. Royle obtained his specimen on the Choor Mountain. I take it to be this animal which Captain Mundy met with during his interesting tour recently published, and which he describes as something between a hare and a guinea-pig; and it is probably, also, the tailless rat which Turner observed in Thibet, where the banks of a lake were everywhere perforated by its burrows. I have since seen perfect specimens of this animal, but have nothing to add to the description here given.

## EDENTATA.

Of this family, the only species known to inhabit the Continent of Asia, the short-tailed Manis, or Scaly Ant-eater of authors (*Manis pentadactyla* of Linneus, *M. macroura* of Desmarest) is found in the lower and less elevated parts of the central regions: but all the *Edentata* are essentially inhabitants of the warmer parts of the earth, more especially of tropical America, and we cannot therefore expect to find their forms reproduced in the Himalayas. Mr. Hodgson has described the Manis of Nepal as a new species, under the name of *M. auritus*, on the supposition of its being distinct from the common species of the plains of Upper India, the *Badjarkita* of the Bengalese (*M. macroura*), which has been known ever since the expedition of Alexander the Great, and is mentioned by Ælian under the name of *φάρταγν*; but Mr. Hodgson in this as in many other instances, has been misled by Griffith's translation of the *Regne Animal*.

## PACHYDERMATA.

- (1122) *Rhinoceros unicornis*.—The great Saul Forest, which extends for many hundred miles along the bases of the Himalayan Mountains, affords shelter to vast multitudes of animals, of which it is probable that many species still remain undescribed. Among other genera, the large *Pachydermata* abound in these situations; the Elephant and Rhinoceros (*Elephas indicus* and *Rhinoceros unicornis*), are extremely numer-

city, make frequent inroads into the lower hills, and commit great depredations among the crops of the natives. The Indian Rhinoceros affords a remarkable instance of the obstructions which the progress of knowledge may suffer, and the gross absurdities which not unfrequently result from the wrong application of a name. This animal, to whose horn the superstition of the Persians and Arabs has in all ages attributed peculiar virtues, became known to the Greeks through the description of Ctesias, a credulous physician of that nation, who appears to have resided at the court of Persia in the time of the younger Cyrus, about 400 years before the birth of Christ. His account, though mixed up with a great deal of credulous absurdity, contains a very tolerable and perfectly recognizable description of the Rhinoceros, under the ridiculous name, however, of the *Indian Ass*; and as he attributed to it a whole hoof, like the horse, and a single horn in the forehead, speculation required but one step further to produce the fabulous Unicorn, such as it appears in the royal arms of England, and such as it has retained its hold on popular credulity for the last two thousand years. The works of Ctesias have perished, but this curious passage is preserved by Phocius; Aristotle adopted his statements regarding the *Indian Ass*, from Ctesias; and no other passage of his writings has given rise to a tenth part of the commentaries, discussions, and speculations which have originated in this. Religion was, as usual, pressed into the discussion, and as the Septuagint had used the word *Monoceros*, it was at one time next to rank heresy to doubt the existence of the Unicorn, and might have brought the imprudent sceptic to the stake. But it is not my intention to renew this fruitless and childish discussion; my only wish is to point out the perfect applicability of Ctesias's description to the Indian Rhinoceros, as it is now well known to naturalist; those who wish to pursue a subject of considerable interest in the history of human knowledge, will find many curious details in the writings of the learned Bochart, in Scaliger, Hardouin, Sivery, and others of the older commentators on Aristotle and Pliny.

(1123) *Sus*. Wild Hogs, but of a smaller variety than those of Bengal, are extremely numerous in all the wooded parts of the mountains; they do not appear to be specifically different from the common wild boar of Europe.

(1124) *Equus*. Horses do not breed on the southern face of the mountains, but are imported from Thibet. A valuable and sure-footed variety, called Tangun, is described by Turner.

The Ass does not appear to have been introduced into any part of the mountains, at least neither Dr. Hamilton nor Mr. Hodgson makes any allusion to its being found in Nepal, and Mr.



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Traill expressly states that it does not exist in Kemaon.

The Dziggetai, however (*Equus hemionus*), is found on the plains of Tibet and Tartary, and is called *Kiang* by the natives.

### RUMINANTIA.

(1125) *Ruminantia* of the Himalayas, as composed of the larger four-footed game most commonly followed by sportsmen, are probably better known than any other department of Hill Mammalogy. Yet even here much still remains to be done to make us thoroughly acquainted with all the different species or varieties which have been mentioned by Mr. Hodgson and other writers; the nomenclature, in particular, is extremely confused, and there is strong reason to believe that the number of species, particularly among the deer tribe, has been greatly increased by the variety of names given to the same animal in the ever varying dialects of the hill tribes. I have, however, only mentioned those of which the existence is known with some degree of certainty.

(1126) *The Musk*. (*Moschus moschiferus*), called Kastooree, is not uncommon in the higher hills. It is said to derive its peculiar odoriferous secretion from feeding on the Kastooree plant, a kind of ground nut, which is strongly impregnated with the same pungent scent, and which the animal digs up with its long tusk. Mr. Hodgson, in a recent number of the Journal of the Asiatic Society, expresses his belief in the existence of three different species of this animal among the Himalayas, and even assigns them distinct names; but the characters are founded entirely on the difference of colour, which is too variable to be depended on for the purpose of specific distinction; and, in fact, Lieut. Smith assures me that the colours vary with the age of the animal; a remark on which I am disposed to place the greater reliance from its agreeing with my own observations, made on many individuals preserved in the museums of this country and the Continent. Whether the "Second species of Musk," mentioned by Dr. Falconer as having been discovered during his recent journey into Cashmere and Little Tibet, be founded on more important characters, we have no means of ascertaining, that Naturalist not having yet published his observations.

(1127) *Jhon Laghuna and Khar Laguna*. Of the genus *Cervus*, the Chittra or Spotted Axis (*C. axis*), and the Laguna or Para and Sûgoriah, called also *Jhon Laghuna and Khar Laguna* spotted and brown varieties of the Hog-deer (*C. porcinus*) are common in the lower hills and forests, but do not ascend the mountains. The specific distinction or identity of the two latter animals has long been a subject of dispute among naturalists; Lieut. Smith believes that the spotted variety is only the young; but I have myself seen animals at least three or

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four years old, with a row of spots on each side of the spine, though, at the same time, I do not believe them to be distinct from the plain coloured or common brown variety, with which they perfectly agreed in every other respect. The subject is worth the attention of those who have an opportunity of settling the question. Three other species of the Axine group of deer are mentioned by Mr. Hodgson, under the collective name of Jarai, but individually distinguished by the Nepalese as the Phusro, Rato, and Kalo, or hoary, red, and black Jarais respectively. The two former have been identified with the *Corvus Hippelaphus* and *Cervus equinus* of Cuvier, the latter certainly without foundation, and the former at least very doubtful; the third, said to be undescribed, is probably the *C. Aristotelis* of Cuvier; but the truth is, that we know very little about them, nor are these different species mentioned by any other author besides Mr. Hodgson. The *Cervus Hippelaphus*, indeed, called *Saumer* or *Sambre* in the plains, is well known in England, where he has long existed in its menageries, and is probably the *C. Aristotelis*, which is familiarly called *Elk* in the Hills, and of which the native name in the British hill provinces is *Jerow* for the male, and *Maha* for the female, names which have been not unfrequently applied to different species: of the Phusro, or Hoary Jarai of Mr. Hodgson, which whatever else it may be, is certainly not the *C. equinus*, since that species does not inhabit Continental India, nothing is known but the name, if, indeed, it be not a mere variety of sex or age. Lieut. Smith describes the Jerow of the Hills as a larger and heavier animal, and with finer horns, than the Saumer of the Plains: the tan and black colours of these two species appears to identify them with the Rato and Kalo Jarais of Mr. Hodgson.

No fewer than three species of deer, with characters approaching to those of the common stag (*C. Elaphus*) of Europe, have been mentioned as inhabitants of Nepal. Two of these, the *Cervus Wallichii* and *Cervus Duvacellii* of Cuvier, are known, though not so perfectly as could be wished; the third, which has been identified with the common stag, appears to be founded upon error. Mr. Hodgson has briefly described the *Cervus Duvacellii* under the name of *C. Elaphoides*, and I have seen a full-grown male in the Zoological Gardens; the comparison of the skull figured by Mr. Hodgson with the horns in the *Ossements Fossiles* leaves no doubt as to the identity of the species. It is called in Nepal *baraiya*, and according to Mr. Hodgson, *Maha* in the Western Hills, a name which, as observed above, Lieut. Smith applies to the female Jerow. *Cervus Wallichii*, called *Barah Singha*, is mentioned by Mr. Walter as an inhabitant of the mountains of Silet and by Mr. Hodgson who confounds it

with the common stag, as found in the Saul Forest, which skirts the foot of the Nepal Mountains, whence it was originally sent to Calcutta by Dr. Wallich. There is no grounds for supposing the existence of a third species of this group in the Himalayas, identical with the Red Deer of Europe (*O. Elaphus*), though the fact is distinctly stated both by Duvaucel and Mr. Hodgson: these authors appear to have mistaken the *O. Wallichii* for that animal, though the specific distinction was afterwards well known to Duvaucel, who sent to Baron Cuvier the description published in the "Ossements Fossiles." Dr. Falconer mentions the discovery of a new species of deer in the Report of his recent Journey to Cashmere and Little Thibet, and Dr. Royle has figured (tab. 5, fig. 1) a female under the name of *O. Dodur*, by which it is known about Saharunpore. He describes it as being about the size of the female Hiru (*Antelope cervicapra*), lighter and more graceful than the Hog-deer, and of an ashy brown colour; but this is all I know of the animal, nor do I find it even mentioned by any other writer. It appears to be unquestionably a new species, and is well worth the attention of Indian naturalists.

Three distinct species of the Muntjac tribe of deer inhabit the Indian continent: one entirely black (*Cervus melas*), one of a light sandy fawn colour, probably the *Ratwa* of the Nepalese (*C. ratwa*, Hodg.), and the third the common Muntjac, called Kacker by the natives, and Barking Deer by the Europeans (*C. Muntjac*, Lin.), of a deeper bay and much smaller size than the *Ratwa*: the former is scarcely the size of the Roe-buck (*C. Capreolus*); the latter nearly equals the Fallow Deer (*C. Dama*, Lin.). Dr. Royle has figured the "Barking Deer" of the North Western Himalayas, v. tab. 5, fig. 2, under the name of *Cervus Ratwa*, conceiving it to be identical with Mr. Hodgson's species may be readily distinguished from the other species of Deer, by their long projecting tusks, horns mounted upon long bony pedicles, and the glandular folds of skin on the forehead. They require, however, to be more attentively examined, and compared with one another.

(1128) Of *Hollow-horned* Ruminants, the *Ghoral* and *Thar* (*Antelope Ghoral* and *A. Thar*), are now pretty well known from the researches by Mr. Hodgson. Both the species are proper to the middle and northern regions of the Hills. The *Thar* of Mr. Hodgson is universally called *Suroo* and *Imoo* in the more western parts of the mountains, the latter name predominating in the higher, and the former, in the lower hills: the name of *Thar*, according to Lieut. Smith, is there applied exclusively to the species of goat which Mr. Hodgson calls the *Jharal*. That beautiful and stately antelope, the *Chiru* (*A. Hodgsonii*), of which our knowledge is entirely due to Mr. Hodgson's researches, is confined to Bhot, Thi-

bet, and the surrounding countries; it appears to be altogether unknown on the southern face of the Mountains, except from an occasional specimen imported by the traders, either for presents or barter. The common Indian antelope, called *Hiru*, and the *Chickarra*, or four-horned species (*A. cervi*, *capra* and *quadricornis*), are confined to the lower hills and forests, and the *Neel-ghau* (*A. picta*) principally to the plains and jungles of the north-western districts. Mr. Colebrooke says that, in the opinion of the Hindoos, the resort of the Antelope sanctifies the countries graced by his presence, while his absence degrades the regions which he avoids. This seems more connected with physical observation than with popular prejudice. The wide and open range in which the Antelope delights is equally denied by the forests of the mountain and by the inundation of the fens. These are the only antelopes of which we have any precise knowledge, as inhabitants of this part of India; but it is probable that others still remain undescribed. Captain Herbert, in his "Tour to the Sutlej," mentions two animals by the names of *Skin* and *War*, the accounts of which do not agree with any known species, and which are therefore well worth the attention of future observers. The *War*, according to Capt. Herbert, is somewhat like the *Musk Deer* (*Moschus Moschiferus*), but with a face more like that of a sheep, divided hoofs, and horns more nearly resembling those of a buffalo than of any other animal; a description which, in spite of the similarity of names, is inapplicable either to the *Thar* or *Jharal*, though indeed, little dependence is to be placed in the descriptions of unscientific observers.

(1129) The *Neel-ghau* deserves a more particular notice, for the purpose of clearing up a point in its history, equally interesting to the Classical Scholar and to the Zoologist. It has been already observed that Modern Naturalists, after the example of Baron Cuvier, have identified the great *Saumer Deer* of India with the animal which Aristotle describes by the name of *Hippelaphus*. "The *Hippelaphus*," says the Greek philosopher, "has also a mane, (of the Horse), above the shoulders, but from this to the head along the top of the neck it is very thin: it has likewise a beard on the larynx...it is about the size of the Stag...the female has no horns...those of the male resemble the horns of the *Dorcus* (*A. Gazelle*)...it inhabits Arachosia. Any one acquainted with the *Neel-ghau* will readily perceive the applicability of this passage to its most obvious characters: In fact Aristotle's description of this animal, under the name of *Hippelaphus*, is more exact and minute than the description of any other animal mentioned in his history; it is evidently taken from personal observation, and it is surprising that the application should have hitherto escaped the penetration both of critics and Zoologists. The older natu-



ralists, such as Gesner and Aldrovandus may be excused for misapplying the passage in question, sometimes to the Elk, sometimes to the common Stag in his winter-dress, when the hair of the neck becomes longer than ordinary, since they were unacquainted with the form and characters of the Neel-ghau; but the continuation of the mistake by their successors, to whom the animal has been long familiar, is altogether unpardonable. This identification, indeed, was absurd enough from the beginning: the habitat of Arachosia, and the assigned form of the horns, were alone sufficient to distinguish the Hippelaphus from either the Elk or common Stag, independently of the critical absurdity of supposing Aristotle to describe such well-known animals at such length and under a new name: but the truth is, that all modern commentators have been misled by a wrong translation of the term *Δορκας* employed by Aristotle, as the name of an animal, to the horns of which he compares those of the Hippelaphus. Now, it is to be observed that the Dorcas of the Greeks and Romans is universally admitted to be the Gazelle of Egypt and Northern Africa, as may be easily proved from many passages in Herodotus and other ancient writers. Theodore Gaza, himself a Greek, and the first translator of Aristotle, very properly renders the word by *capra*, but Buffon having criticised Gaza's ignorance, and affirmed that the word should really be translated *caprea*, every body has since followed the translation of Buffon, and the Dorcas of Aristotle has been accordingly considered identical with the Roe-buck, whilst the Dorcas of all other ancient writers is acknowledged to be the Gazelle.

This seems to have been one of the principal sources of error which misled Baron Cuvier, after the example of his predecessors, to identify the Hippelaphus of Aristotle with a species of Deer. The head and skin of the large Indian Saumer had been sent to Paris by Diard and Duvaucel; the hair of the neck was observed to be considerably longer and coarser than that on the rest of the body, the horns had only two antlers, like those of the Roe-buck, and it came from India. Baron Cuvier immediately concluded that he had discovered the real Hippelaphus of Aristotle, and taken considerable pains to prove it. Oss. Foss. IV, 42. Against this opinion of the most distinguished of modern naturalists, however, I have to urge objections as grave as those which lay against the ancient error which identified the Hippelaphus with the stag and elk. In the first place, as I have just shown, the fancied similarity of the horns of the Hippelaphus to those of the Roe-buck, arises from a false translation of the word Dorcas; when this term is properly translated, Gazelle, the horns of the Hippelaphus, to be similar to those of the Dorcas, should be small, round, and without branches;—such are the horns of the Neel-ghau, and

such are not the horns of the Saumer. In the second place, the Saumer Deer has certainly longer and stiffer hair on the neck than elsewhere, but it is equally long and rough over the whole neck, as well on the sides as above and below, and has no resemblance whatever to the mane of the horse and mule to which Aristotle compares it. In fact the description of Aristotle does not apply to it in any particular. The Saumer does not show the least appearance of the thin mane along the top of the neck, longest and thickest on the shoulders; neither has it anything that can be called a beard, distinct, at least from the general roughness of the neck which Baron Cuvier calls its mane. But even allowing the rough hair on the under surface to be called a beard; still Aristotle's description does not apply, for this rough hair covers the whole throat in the Saumer from the head to the chest, whilst the Greek philosopher restricts the beard of the Hippelaphus to the *κάρυνξ*, and this is precisely the situation in which the long bunch of coarse hair, nearly a foot in length, is found on the throat of the Neel-ghau. In fact there is not a single point, even to the most minute particular, the habitat of Arachosia, for instance, the modern Punjab, where the Neel-ghau is extremely abundant, and where the Saumer does not exist, at least we have no evidence of the fact,—in which Aristotle's description of the Hippelaphus does not perfectly agree with this now well known animal; and we may therefore safely conclude that we have at length finally settled a question which has long puzzled both critics and Zoologists. The Neel-ghau should consequently assume in future the specific appellation of *Antelope Hippelaphus*, whilst the Saumer Deer, to which that name has been erroneously applied may be more appropriately called *Cervus Saumer*.

(1130) *Capra*. Two distinct species of the genus *Capra* occur in the Himalayas: *Capra jemblaica* of Hamilton Smith, called *Jharal* in Nepal, and *Thar* in the British provinces, is by far the more common of the two, and is stated by Mr. Hodgson to differ from other goats by having four teats. The second species has never been described, but its existence is placed beyond a doubt; Major Kennedy, while resident at Simla, had two stuffed specimens, procured in the neighbouring mountains, and the animal is mentioned by various tourists under the name of the Ibex, which it appears to resemble in the form of the horns and other characters. Dr. Falconer, in the Report of his late Journey to Cashmere and Little Thibet, mentions the discovery of two new species of goats; but as he does not enter into any detail on the subject, we have no means of ascertaining how far they may prove to be identical with or different from, the two species here mentioned. Different varieties of the domestic goat the most valuable of which are the Changra, or shawl goats, of two breeds, distinguished as

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the longer and the smaller Changra, are found in the more alpine regions; their wool forms an article of extensive traffic, but we are much in want of detailed comparative descriptions and good figures of these, as of all the different breeds of cattle and other domestic animals in India; a subject of great interest, which has been extensively illustrated at home, but which has met with little or no attention out of Europe.

(1131) *Ovis*. There are likewise two wild species of sheep and numerous domestic varieties, found in the Himalayas. The *Burrhal* called *Nahoor* by the Nepalese (*Ovis Nahoor* of Mr. Hodgson), is intermediate in character between the Mouflon (*O. Musmon*) of Corsica, the supposed parent of our domestic sheep, and the Aoudad (*O. tragelaphus*) of Northern Africa, which latter species it resembles in the form of the horns and the absence of the crumens, or tear-pits, which distinguish the rest of the genus. The second species, called *Banbhera* in Nepal, is less known, but appears to approach very nearly to the Argali of Siberia (*O. Ammon*), if, indeed, it be not identical with that animal: the skull and horns are in the Museum of the Royal Asiatic Society, to which it was presented by Sir Alexander Burnes; but as there is no specimen of the Argali in this country with which to compare it, no opinion can be offered as to its specific difference. The animal seems to be more properly a native of Thibet and Chinese Tartary, and seldom appears on the southern part of the Himalayas; at least sportsmen had never met with it, and Mr. Hodgson was long doubtful of its existence. Of the domestic sheep of the Hills, besides the Dumba, or common variety of Upper India, Mr. Hodgson mentions a breed called *Barwall* as occurring in the Kachar, and another called *Hoaniah*, peculiar to Thibet: these are used as beasts of burthen.

(1132) *Bovidae*. Of the genus *Bos*, the buffalo (*B. Bubalus*), and its representative, the *Arnee*, *Bos Bhinse*, are confined to the sultry forests at the foot of the mountains. The latter is a very distinct variety, if not a different species, from the *Jungle Bhinse* of Bengal and Assam, so well known for the great length of its horns; the *Arnee* of the Saul forest is the short thick horned variety, of which there are many skulls, preserved in our Museums, and is said to be a much lighter made animal, though with a thicker skin than the *Jungle Bhinse*.

(1133) The *Zebu* (*Bos indicus*) is common in every part of the Hills; but the peculiar and appropriate species of the Himalayas is the Changree, or Yak (*Bos pæphagnus*, Pallas), which composes the domestic cattle of Tartary, and is not uncommon on the southern slopes of the higher Mountains, where a cross between it and the Zebu, or common Indian Ox, is much used in agriculture, and preferred to either of the pure races. This hybrid is not uncommon at Simla

and it is to be hoped that some intelligent observer will take advantage of this circumstance to ascertain from actual experiments whether the sexes be productive *inter se* or when united with one of the pure races; or whether, like the common mule, they be absolutely barren. Lient. Smith informs that he has seen the Yak wild on the confines of Chinese Tartary.—*Ogilby in Royle's Illustrations of the Botany, &c. of the Himalayan Mountains, Supplementary Patr.*—Quoted in and extracted from *Madras Lit. Soc. Journal* for 1840.

(1133b.) MAMMALIA OF MALAYAN PENINSULA AND ISLANDS. Dr. Theodore Cantor gives the following:—The Localities printed in Italics signify those from whence the animals of the Catalogue were obtained; in ordinary type those previously given by authors.

## QUADRU MANA.

### SIMIADÆ.

#### GEN.—PITHECUS, *Geoffroy*.

#### (1133c.) PITHECUS SATYRUS, *Geoffroy*.

SYN.—*Simia Satyrus*, Linne,

*Simia Agrias*, Schreber.

*Singe de Wurmb*, Audebert.

*Papio Wurmbii*, Latreille.

*Pithecus Satyrus*, Desmarest.

*Simia Wurmbii*, Kuhl.

*Orang Pundak*, Raffles.

*Simia Satyrus*,

*Simia Abelii*,

*Simia Wurmbii*,

} apud Fisher.

*Simia Satyrus*, apud Ogilby.

*Satyrus rufus*, Lesson.

*Pithecus Satyrus*, apud Martin.

*Simia Satyrus*, apud Schinz.

"Orang Utan" of the Malays.

HAB.—*Borneo, Sumatra.*

The physiognomy and the colour of the face exhibit a marked difference in living individuals from the two localities. An excellent likeness of a young male Bornean Orang Utan, living in Dr. Cantor's possession upwards of two years, has lately been taken by Mr. Thornam, one of the artists of the scientific expedition on His Danish Majesty's Ship 'Galathea.'

#### GEN.—HYLOBATES, *Illiger*.

#### (1133d.) HYLOBATES LAR, *Ogilby*.

SYN.—Grand Gibbon, Buffon.

*Homo Lar*, Linne, Mantiss.

*Simia longimana*, Schreber.

*Simia longimana*, Grand, et Petit Gibbon,

Erxleb.

*Simia Lar*, Linne Syst.

*Le Gibbon*, Audebert.

*Pithecus Lar*, Desmarest.

*Simia albimana*, Vigors and Horsfield.

*Simia Lar*, apud Fischer.

*Hylobates Lar*, Lesson, apud Martin.

*Hylobates albimanus*, apud Schinz.

"Ungka etam" of the Malays of the Peninsula.



MAMMALIA OF MALAYAN PENINSULA AND ISLANDS.

HAB.—*Malayan Peninsula*. Siam, Burmah, Tenasserim.

*Light-coloured Var.*

SYN.—Petit Gibbon, Buffon.

*Simia Lar*, Linne.

*Pithecus variegatus*, Geoff.

*Pithecus variegatus*, apud Kuhl.

*Pithecus variegatus*, apud Desmarest.

*Hylobates variegatus*, Ogilby.

*Hylobates leuciscus*, apud Cantor Ann. and Mag. of Nat. Hist.

“Ungka puti” and “Wow-wow” of the Malays of the Peninsula.

The colour varies from blackish-brown, to light-brown, yellowish or dirty-white, sometimes uniform, sometimes mottled. The index and middle toes, of both or of one foot, are in some individuals, of whatever sex or shade of colour, united by a broad web throughout the whole of the first phalanx: in some partially so, and in others, not. The ribs vary from twelve ( $7 \times 5$ ) to thirteen pairs ( $7 \times 6$ ), as observed by Mr. Blyth. —(*Journal. Asiatic Society* 1841, Vol. X. page, 839.

(1133e.) *HYLOBATES AGILIS*, F. Cuvier.

*Var. Ungka etam*, Martin.

SYN.—Ungka etam, Raffles.

Oungka, *Hylobates Lar*, F. Cuv.

*Simia Lar*, Vigors and Horsfield.

*Hylobates Rafflesii*, Geoff, apud Ogilby.

*Hylobates variegatus*, Muller apud Schinz.\*

“Ungka etam”, of the Malays of the Peninsula.

\* Schinz gives as a synonyme: *Pithecus variegatus*, Geoff. which, however, is *Hylobates Lar*, Var.

HAB.—*Malayan Peninsula*, (*Malacca, Purlis, Keddah, Pungah*) Sumatra.

The first phalanges of the index and middle toe are in some individuals of either sex, partially or entirely united by a web. Sometimes the first phalanx of the middle toe is partially united to the fourth.

An adult male examined, had thirteen pair of ribs ( $6 \times 7$ ), an adult female fourteen ( $7 \times 7$ ), a young male on the left side thirteen ( $7 \times 6$ ), on the right twelve ( $7 \times 5$ ). In these three individuals the stomach was constricted at the fundus and the pyloric part, which characters, when compared with specimens of *Hylobates agilis* from Sumatra, will go far to decide the identity of that species and *H. Rafflesii*. On the Malayan Peninsula, the latter appears to be less numerous than *H. Lar*. The light-coloured Var. of *H. agilis* I have not seen.

(1133f.) *HYLOBATES LEUCISCUS*, Kuhl.

SYN.—“Wou-wou,” Camper.

*Simia leucisca*, Schreber.

*Simiamoloch*, Audebert.

*Pithecus cinereus*, Latereille.

*Pithecus leuciscus*, Geoffroy.

*Pithecus leuciscus*, apud Desmarest.

*Simia leucisca*, apud Fisher.

*Hylobates leuciscus*, apud Ogilby.

*Hylobates leuciscus*, apud Schinz.\*

\* Among the Syn. occurs Ungka puti, Raffles, which is *Hylobates agilis*.

HAB.—*Borneo. Java.*

GEN.—*SEMNOPITHECUS*, F. Cuv.

(1133g.) *SEMNOPITHECUS OBSCURUS*, Reid.

SYN.—*Simia maura*? Lin. Lotong, apud Raffles.†

*Semnopithecus leucomystax*, Temm. in M.S.S.

*Semnopithecus obscurus*, apud Martin.

*Presbytes obscura*, Gray, List of Mamm. B. M.

*Semnopithecus sumatranus*, Muller, apud Schinz ‡

*Semnopithecus halonifer*, Cantor, proceed. Linn. Soc.

“Lotong” or “Lotong clam,” of the Malays of the Peninsula.

† The Hab. Pinang and Singapore, in neither of which islands *Semnopithecus femoralis* appears to occur, tends to prove, that Sir S. Raffles did not, as it has been supposed, refer to that species. His short description indicates *S. obscurus* (Lotong,) the most common species in both islands. Sir S. Raffles evidently did not describe the living animal, or he would not have omitted one of the most striking characters, viz., the white marks of the face, which, in preserved specimens, become obliterated, so that the face appears uniformly black. The omission of this character by Sir S. Raffles, and subsequently by later describers of this species, has given rise to confusion.

‡ Schinz repeats *S. femoralis*, Martin, as a Syn. for *S. sumatranus*, and says in a note, that Muller in his monograph of *Semnopithecus* refers that species to his *S. sumatranus* (Schinz Syn. Mam. 1. p. 31, note.) Were even the two identical, the species should not have been renamed, as *S. femoralis*, Horsfield, not Martin, would take precedence, being the denomination under which Dr. Horsfield described it in the Appendix to the Life of Sir. T. Stamford Raffles, 1830.

HAB.—*Malayan Peninsula, Pinang, Singapore.* District adjacent to Singapore, in the Malayan Peninsula.

(1133h.) *SEMNOPITHECUS ALBOCINEREUS*, Schinz.

SYN.—*Cercopithecus albocinereus*, Desmarest.

*Simia albocinerea*, Fisher.

*Semnopithecus dorsatus*, (young) Waterhouse M.S.S. apud Martin.\*

*Presbytes cinerea*, Gray, List.

*Semnopithecus albimanus*, Is. Geoff?

Ka-ka of the Malays of the Peninsula.

\* Martin, p. 581, refers the young *S. dorsatus*

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to *S. femoralis*, but the description is that of the young of the present species.

HAB.—*Malayan Peninsula*.

The young of this species, described by Martin, p. 481, is from the peculiar distribution of the colours, as easily distinguished from the young of *S. obscurus*, as it is difficult to distinguish the adults of these two species. Both attain to the same size, have in common the shape of the body, the white marks of the face, and the general distribution of colours. In the adult of the present species the prevailing colours are clear ashy-grey above, and white below. On either parietal bone, the hairs form a whorl, and the anterior are directed forward, projecting beyond the eyebrows. The two whorls are distinct in the young, though the hairs of the head are too short to mingle with the long, erect, divergent, black hairs of the eyebrows. Just below the spot where the two whorls come in contact, the skull is naked, thus forming a rather broad, triangular forehead. The general colour of *S. obscurus*, both in the young and adult state, is considerably darker. On the upper parts a blackish, or brownish ash colour prevails, lighter below, which acquires in some individuals a whitish appearance, from the white skin of the stomach, which is but scantily covered with hairs. Of parietal whorls there is no trace; the hairs of the head, directed backwards, originate in a peak as far down as the glabella, and are smoothed down on the top of the head from the occipital crest backward.

(1133i.) SEMNOPITHECUS CRISTATUS, Horsfield.

SYN.—*Simia cristata*, Chingkau, Raffles.

*Semnopithecus pruinus*, Desmarest.

*Semnopithecus pruinus*, apud Lesson.

*Semnopithecus cristatus*, apud Martin.

*Presbytes cristata*, Gray: \* List.

*Semnopithecus cristatus*, apud Schinz.\*

\* Gray quotes *S. maurus*, Horsfield, and Schinz *S. femoralis*, Martin, as synonyms, both of which are species, in physiognomy, colours, and, as far as *S. maurus* is concerned, in habits distinctly different from the present one.

HAB.—*Pinang, Malayan Peninsula*. Sumatra, Borneo, Banka.

The whitish colour round the eyes and the mouth is present, though less distinct in the this than in the preceding two species.

(1133j.) SEMNOPITHECUS FEMORALIS, Horsfield.

SYN.—*Semnopithecus chrysomelas*, Muller, apud Martin and Schinz.

HAB.—*Purlis (on the Malayan Peninsula)*. Borneo Java (?), Sumatra (?)

In a young male of this, apparently every where difficultly procurable species, the face during life was intense black, except the white-haired lips and the chin, which were of a milk-white colour. In the preserved specimen, the latter soon changed into the dull brownish-black of the

rest of the face. The interdigital membrane, often loosely connecting the first phalanges of the four fingers and toes in *S. obscurus*, albocineus, cristatus and other Malayan monkeys, was also present in this individual, in which even the first and second phalanges of the index and middle toe were thus connected. In preserved specimens, the interdigital web becomes shrivelled and indistinct, and therefore, being at all times a very questionable, if not altogether inadmissible, specific character, ought in such state to be least relied upon. On its arrival at Pinang, the animal was in too sickly a state to allow of its natural habits being observed.

GEN.—CERCOPITHECUS, apud Ogilby.

(1133k.) CERCOPITHECUS CYNOMOLGUS, Ogilby.

SYN.—*Simia cynomolgus*, Linne.

*Simia aygula*, Linne.

*Simia attys*, Schreber.

*Macacus cynomolgus*, Desmarest.

*Simia fascicularis*, Raffles.

*Cercocebus aygula*, Geoff apud Horsfield.

*Macacus cynomolgus*, apud Gray: List.

*Macacus cynomolgus*, apud Schinz.

"Kra" of the Malays of the Peninsula.

HAB.—*Pinang, Malayan Peninsula*. Sumatra, Java, Banka, Borneo, Celebes, Timor, Tenasserim, Nicobar Islands.

The first phalanges of the four fingers and toes, and in some individuals also the second phalanges of the toes, are united by a membrane.

GEN.—PAPIO, apud Ogilby.

(1133l.) PAPIO NEMESTRINUS, Ogilby.

SYN.—*Simia nemestrinus*, Linne.

*Simia platypygos*, Schreber.

*Simia fusca*, Shaw.

*Macacus nemestrinus*, Desmarest.

*Simia carpolegus*, Raffles.

*Macacus nemestrinus*, apud Gray, List.

*Macacus nemestrinus*, apud Schinz.

"Broh" of the Malays of the Peninsula.

HAB.—*Pinang, Malayan Peninsula*. Sumatra, Borneo.

The interdigital membrane of the first phalanges of the four fingers and index, and middle toe, occurs also in this species.

## LEMURIDÆ.

GEN.—NYCTICEBUS, Geoffroy.

(1133m.) NYCTICEBUS TARDIGRADUS, Waterhouse, Cat. Zool. Soc.

SYN.—*Lemur tardigradus*, Linne apud Raffles.

*Nycticebus bengalensis*, Geoff.

*Nycticebus javanicus*, Geoff.

*Loris tardigradus*, Geoff.

*Stenops javanicus*, Van der Hoeven:

*Stenops tardigradus*, Wagner, apud Schinz.

"Kukang" of the Malays of the Peninsula.

HAB.—*Pinang, Malayan Peninsula*, Java, Siam, Tenasserim, Arracan, Bengal, Sylhet, Assam.



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The sublingual appendage is cartilaginous, of a white colour; the apex divided in a number of fine points. The new-born is of the same colour as the adult, but paler, and has the dense, soft fur, mixed with a number of long hairs, grey at the base, white at the point. In a male, measuring from the apex of the nose to the root of the tail one foot two and a half inches, the tail five-eighths of an inch, the dimensions of the intestinal canal, were:

Small Intestines,..... 3 feet  $\frac{1}{2}$  inches.

Large ditto,..... 2 „  $3\frac{1}{2}$  „

Cæcum,..... 0 „  $3\frac{1}{2}$  „

GEN.—GALEOPITHECUS, *Pallas*.

(1133n.) GALEOPITHECUS TEMMINCKII, Waterhouse.

SYN.—Lemur volans, Linn. apud Marsden and Raffles.

“Kubong” or “Kurbong” of the Malays of the Peninsula.

HAB.—Singapore, Pinang, and other Islands in the Straits of Malacca. Luncavy Islands Malay Peninsula. Java, Sumatra, Borneo, Pelew Islands, Siam.

Two individuals are never of precisely the same design and ground-colour, which latter varies from clear ashy-grey to greyish-brown or chesnut. The white spots on the back of the anterior extremities, appear to be constant in every age. Though there are four mammæ, situated in pairs one above the other, close to the axilla, of a number of females with young, none had more than one offspring, which was carried wrapped in the wide mantle-like membrane. In several shot on the hills at Pinang, the stomach contained vegetable matter, but no remains of insects. In confinement, plantains constitute the favourite food, but deprived of liberty the animal soon pines and dies. The anterior margin of the broad smooth tongue has a fringed appearance, produced by a number of rounded papillæ. In a male measuring from the apex of the nose to the root of the tail one foot four inches, the tail nine inches, the intestinal canal was of the following dimensions:

Small Intestines,..... 4 feet 4 inches

Large do ..... 7 „ 7 „

Cæcum,..... 0 „ 11 „

Costæ veræ seven pairs, spuræ six pairs.

CARNIVORA.

CHEIROPTERA.

INSECTIVORA.

GEN.—RHINOPOMA, *Geoffroy*.

(1133o.) RHINOPOMA HARDWICKII, Gray.

SYN.—Vespertilio (Rhinopoma) Hardwickii, Elliot.

HAB.—Malayan Peninsula. Southern Mahratta country, Calcutta, Allahabad,\* Agra,† Mirzapore.

\* Numbers inhabit the subterraneous Hindoo place of worship within the Fort at Allahabad.

† In the Taj-Mahal.

A single male, in no way differing from Bengal individuals, was obtained by Captain Congalton, H. C. Steamer ‘Diana,’ in a cave on an island in Girbee river, in latitude  $8^{\circ} 0'$ , on the Malayan Peninsula.

This species is provided with a true cæcum, the existence of which in all Cheiroptera has erroneously been denied, or restricted to the cardiac cæcum observed in the genera *Vampyrus* and *Pteropus*. The present species, and *Megaderma spasma*, also possessing a true cæcum, thus present a higher organisation than has hitherto been attributed to Cheiroptera.

Length of the small Intestine,...  $7\frac{3}{8}$  inches.

„ „ large ditto,..... 1 „

„ „ cæcum,.....  $0\frac{3}{8}$  „

GEN.—MEGADERMA; *Geoffroy*.

(1133p.) MEGADERMA SPASMA, Geoffroy.

SYN.—Vespertilio spasma, Schreber.

Megaderma trifolium, Geoffroy.

Megaderma spasma, apud Fisher.

Megaderma spasma, apud Schinz.

HAB.—Pinang, Malayan Peninsula. Singapore, Java, Ternate.

0 1—1 4-4

Incis. — Canin. — Molar. —

4 1—1 5-5

Length of the head and body.....  $3\frac{3}{8}$  inches.

„ „ inter-femoral membrane. 1 „

Extent of the flying membrane,..... 14 „

The five caudal vertebræ project one quarter of an inch beyond the pelvis, but are completely enveloped in the inter-femoral membrane, and therefore not apparent. The inguinal warts are, as in the Rhinolophi, most developed in the adult female. A true cæcum, though smaller than in *Rhinopoma Hardwickii*, is present in this species.

Length of the small Intestines,..... 7 inches.

„ „ large ditto,.....  $1\frac{1}{8}$  „

„ „ cæcum,.....  $0\frac{1}{8}$  „

GEN.—NYCTINOMUS, *Geoffroy*.

(1133q.) NYCTINOMUS TENUIS, Horsfield.

SYN.—Nyctinomus tenuis, apud Fisher.

Molosse grele, Temminck.

Dysopes tenuis, Schinz.

HAB.—Malayan Peninsula. Java, Sumatra, Borneo.

Two individuals had the back of a velvety snuff colour, becoming a shade lighter on the underparts. Entire length of the larger four and four-eighth inches, of which the tail one and two-fourth inches. Extent of the flying membrane ten and four-eighth inches. In the size of the ears some difference exists in the two.

GEN.—TAPHOZOUS, *Geoffroy*.

(1133r.) TAPHOZOUS MELANOPOGON, Temminck.

SYN.—Taphozous melanopogon, apud Schinz.

HAB.—Pulo-Tikus, Pulo-Lancavy, Malayan Peninsula. Java, Caves of Kanneria.

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Temminck's description, as quoted by Schinz, is taken from the adult male, the Malayan individuals of which differ in having the black beard surrounded by a broad light-brown band, covering, like a pelerine, the chest and shoulders. The rest of the lower parts are either white or brownish-white. The flying membrane in the adult male is whitish; in the females and young males it is blackish or brownish between the legs, along the sides of the body and the arms. The colour of the female and young male is on the back of a more or less brownish mouse-grey, becoming much lighter or whitish beneath, but both are destitute of the black beard, which, out of a number of between forty and fifty from different Malayan localities, occurred but in seven males, although some of the beardless males in size and extent of flying membrane equalled, or even slightly exceeded, the bearded. The entire length of the largest male was four inches, of which the tail measured one inch.

Extent of flying membrane fifteen and four-eighth inches.

0	1—1	4-4
Incis.—	Canin.—	Molar,—
4	1—1	5-5

(1133s.) *TAPHOZOUS SACCOLAIMUS*, Temminck.

SYN.—*Taphozous pulcher*, Elliot MSS. apud Blyth.

HAB.—*Pinang*. Java, Sumatra, Borneo, Celebes, Southern India.

In two males captured at Pinang in houses in the valley, the colours somewhat differ from Temminck's description, quoted by Schinz. In the larger, the head and back are of a sooty black, with a few white dashes, the lower parts of a pure white. The flying membrane is black between the legs, along the sides of the body and the arms, and between the index, second and third fingers; the rest being dull semi-transparent white. The length from the apex of the nose to the posterior margin of the inter-femoral margin, is four and seven-eighth inches, of which the tail measures one inch. The extent of the flying membrane eighteen inches. Dentition as in *T. melanopogon*. The smaller differs in having the chest of a pale brownish-white, the abdomen and the pubes light rust-coloured, leaving the sides pure white. Mr. Blyth quotes *Taphozous pulcher*, Elliot, from Southern India, as being, "black-brown above with white pencillings, and pure white below," (Journal As. Soc. xiii. 1844. p. 492,) from which, as well as from Mr. Elliot's specimen, at present in the Museum of the Asiatic Society, it appears that the Indian more resemble the Malayan individuals than those of the Indian Archipelago, described by Temminck. The internal surface of the gular sac secretes an odorous oily fluid, of a light brown colour.

GEN.—*RHINOLOPHUS*, Geoffroy.

*RHINOLOPHUS*, Gray.

(1133t.) *RHINOLOPHUS AFFINIS*, Horsfield.

HAB.—*Pinang*. Java.

Of two individuals, the male is reddish-brown above, light greyish-brown beneath; the female is above golden fulvous, which becomes lighter on the lower parts.

Entire length of the male,  $2\frac{4}{8}$  ins. female,  $2\frac{7}{8}$  ins.

Tail,.....  $\frac{4}{8}$  „ „  $\frac{5}{8}$  „

Extent of flying membrane  $1\frac{2}{8}$  „ „  $12\frac{4}{8}$  „

2 1—2 5-5

Incis. — Canin. — Molar, —

4 1—1 5-5

The inguinal warts are highly developed in the female.

*HIPPOSIDEROS*, Gray.

A. *Adult male with a frontal pore, with a tuft rigid hairs.*

(1133u.) *HIPPOSIDEROS DIADEMA*, Gray?

SYN.—*Rhinolophus Diadema*, Geoffroy?

HAB.—*Pinang*, *Malayan Peninsula*. Timor.

The Malayan individuals are, according to age and sex, of a more or less intense reddish or greyish-brown above, under certain lights assuming a golden lustre, owing to the whitish points of the hairs; beneath, they are of a lighter greyish-brown. Individuals occur of a light golden-brown, in colours resembling *Rhinolophus larvatus*, Horsfield. In the adult male, the livid flesh-coloured nasal appendage is larger, more complicated, and somewhat different from the figure given by Geoffroy St. Hilaire, (Ann. du Museum XX, Pl 5 and 6), which resembles the female in the simpler appendage and in the absence of the frontal pore. The latter organ, in the adult male, is large, secreting a yellowish brown oily fluid, the odour of which resembles that of *Arctictis Binturong*, Fisher. A female, during lactation, presented a great inequality in the development of the inguinal warts, of which the right measured one-quarter of an inch in length. At the time of her capture, it was reported that a young one had been "sucking" the right wart. Not having myself observed the young clinging to that organ, I cannot vouch for the correctness of a statement which, if authentic, would tend to explain the use, being to afford support to the young, when not sucking. The size of the Malayan individuals appears to exceed those from Timor, the entire length of the former being five and six-eighth inches, of which the tail measures two inches. Extent of the flying membrane twenty-one and a half to twenty-two inches. The extremity of the 2nd phalanx of the fourth and fifth fingers is bifid, or terminating with two minute diverging joints, a structure also existing in the Malayan individuals of the following species.

2 1—1 5-5

Incis. — Canin. — Molar. —

4 1—1 5-5



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(1133f.) *HIPPOSIDEROS NOBILIS*, Gray.

SYN.—*Rhinolophus nobilis*, Horsfield.

*Rhinolophus nobilis*, apud Fisher.

*Rhinolophe fameux*, Temminck.

*Rhinolophus nobilis*, apud Schinz.

HAB.—*Pinang*, *Malayan Peninsula*. Java, Sumatra, Timor, Amboyna.

The frontal pore is less developed than in the former species, as compared with which the present is of a more slender form, though of a size little less inferior. Entire length five and four-eighth inches, of which the tail measures two and one-eighth inches. Extent of flying membrane twenty-one and four eighth inches. Dentition similar to that of *H. Diadema*. In the valley of Pinang single individuals of both species are at night abroad at all seasons, but during the rains they are particularly numerous.

(1133w.) *HIPPOSIDEROS VULGARIS*, Gray.

SYN.—*Rhinolophus vulgaris*, Horsfield.

*Rhinolophus insignis*, Var. apud Temminck.

*Rhinolophus insignis*, Horsfield apud Schinz.

*Rhinolophus vulgaris*, Horsfield *female of insignis*, apud Schinz.\*

HAB.—*Pinang*. Java.

\* The only individual of *Rhinolophus vulgaris*, Horsfield, observed at Pinang, happened to be a male.

Entire length four inches, of which the tail measures one and three-eighth ; extent of flying membrane fourteen inches.

2	1—1	4-4
Incis.—Canin.	—	Molar, —
4	1—1	5-5

(1133x.) *HIPPOSIDEROS MURINUS*, Gray.

SYN.—*Rhinolophus murinus*, Elliot.

HAB.—*Pinang*. Southern Mahratta Country, Nicobar Islands.

Entire length two and four-eighth inches, of which the tail measures one inch. Extent of flying membrane nine and four-eighth inches. Dentition similar to that of the last species.

*B. Forehead simple.*

(1133y.) *HIPPOSIDEROS GALERITUS*, N. S.

*H. prosthematis simplicis membrana transversa lata, alte erecta, auriculas tangente ; auricularum, late pyriformium, apicibus lacinia exsertis, besse postico lobuloque basali villosis ; vellere longo, denso, molli, bicolore ; supra saturate, subtus pallidius-fusco-rufescenti.*  
Latet fœmina.

HAB.—*Pinang*.

Entire length three inches, of which the tail measures one inch. Extent of the flying membrane ten and four-eighth inches.

2	1—1	4-4
Incis. — Canin. —	—	Mol. —
4	1—1	5-5

The livid flesh coloured nasal appendage is simple but large, occupying the whole upper part

of the face and the forehead ; the horse-shoe or nasal disk covers the short, rounded, hairy muzzle, which has two leaves on either side ; the transversal membrane is concave, as broad and long as the horizontal horse-shoe, which it joins under a right angle, while its sides are almost in contact with the ears. The latter are sub-erect, broader than long, their breadth equalling the length of the head ; the shape is broad, pyriform, narrowing towards the apex, which appears like a small artificially rounded flap, scarcely elevated above the level of the fur covering the vertex. More than two-thirds of the back of the ear is covered with fur, leaving a narrow naked line along the external margin, which, as well as the singular shape of the ear itself, affords a distinguishing character. The hairs are buff or whitish at the base, the other half of their length brown. The general colour of the upper parts is deep-brown, with a slight reddish hue, becoming a shade lighter beneath.

This species somewhat resembles *Hipposideros apiculatus*, Gray (*Vespertilio speoris*, Schneider, apud Schreber ; *Rhinolophus speoris*, Geoffroy,) from which it however differs in the absence of the frontal pore, in the shape of the ears, and in colours. A solitary male was captured in the valley of Pinang.

GEN.—*VESPERTILIO*, Linne.

(1133z.) *VESPERTILIO*, Gray.

*VESPERTILIO ADVERSUS*, Horsfield?

SYN.—*Vespertilio adversus*, Fisher?

*Vespertilio adversus*, Temminck?

*Vespertilio cineraceus*, Blyth, MSS.

HAB.—*Pinang*. Java, Calcutta.

This bat having the characteristic distinction of the upper incisor, described by Horsfield, is above greyish-brown, beneath light-greyish, measuring in length three and two-eighth inches, of which the tail is one and four-eighth inch. Extent of flying membrane ten and four-eighth inches. It differs from *V. adversus* in having on each side five molars, of which but two are spurious, which character also obtains in *V. cineraceus*, Blyth MSS. and specimen in the Museum Asiatic Society, which (as observed by Mr. Blyth,) as well as the present, may prove varieties of *V. adversus*, Horsfield.

*KIRIVOULA*, Gray.

(1133a.) *KIRIVOULA PICTA*, Gray.

SYN.—*Vespertilio ternatanus*, Seba?

*Vespertilio pictus*, Pallas, apud Horsfield.

*Vespertilio kerivoula*, Boddaert.

*Vespertilio kerivoula*, apud Geoffroy.

HAB.—*Pinang*. Java, Sumatra, Borneo, Ceylon.

(1133b.) *KIRIVOULA TENUIS*, Gray.

SYN.—*Vespertilio tenuis*, Temminck, apud Schinz.

HAB.—*Pinang*. Java, Sumatra, Borneo.

A single male, in colours slightly differing from Temminck's, being above of a dark greyish-brown, many of the hairs with white points ; beneath of

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a lighter shade. Entire length three and two-fourth inches, of which the tail one and four-eighth inch. Extent of flying membrane ten inches.

	2-2	1-1	5-5
Incis.	—	Canin. —	Mol. —
	6	1-1	5-5

## TRILATITUS, Gray.

(1133c.) *TRILATITUS HORSFIELDII*, Gray.

SYN.—*Vespertilio tralatitius*, Horsfield.

*Vespertilio Gartneri*, Kuhl, apud Schinz.

HAB.—*Pinang*. Java, Sumatra.

*SCOTOPHILUS*, Leach apud Gray.

(1133d.) *SCOTOPHILUS TEMMINCKII*, Gray.

SYN.—*Vespertilio Temminckii*, Horsfield.

*Vespertilio Belangerii*, Isid. Geoff.

*Vespertilio noctulinus*, Isid. Geoff.

*Scotophilus castaneus*, Gray.

*Nycticeius Temminckii*, Schinz.

*Nycticeius Belangerii*, Temminck, apud Schinz.

*Nycticeius noctulinus*, Temminck, apud Schinz.

“Klawah” of the Malays of the Peninsula.

HAB.—*Singapore, Pinang, Malayan Peninsula and Islands*. Java, Sumatra, Borneo, Timor, Pondicherry, Calcutta.

As observed by Schinz, this species is very variable in its colours according to age, all of which variations occur in individuals inhabiting Pinang and the Malayan Peninsula. The following are the specific names attributed to different individuals of this species:—

1. *Vespertilio Temminckii*, as originally described and figured in *Zoological Researches in Java*. Back dark-brown; greyish-brown underneath. Entire length four inches six lin., of which the tail one five-eighth of an inch; extent of flying membrane twelve inches.

2. *Scotophilus castaneus*, Gray.

3. *Nycticeius Belangeri*, Temminck, apud Schinz. Hairs of the back brown at the base, chesnut or olive-chesnut at the apex; beneath light yellowish-brown, isabella or whitish. Entire length 3½” of which the tail 1” 11” extent of flying membrane 13.”

	1-1	1-1	4-4
Incis.	—	Canin. —	Mol. —
	6	1-1	5-5

4. *Nycticeius noctulinus*, Temminck, apud Schinz, is the very young. Above more or less intense brown or rust-coloured; beneath isabella or light greyish-brown. Entire length three to three two-eighth inches, of which the tail seven-eighth to one two-eighth of an inch. Extent of flying membrane eight six-eighth to nine inches. In this state it has frequently been observed clinging to the mother.

	2-2	1-1	4-4
Incis.	—	Canin. —	Mol. —

This species is exceedingly numerous, forming large congregations in sheltered situations on the Malayan Peninsula, and in the caves on the numerous islands of limestone which stud the shores from Maulmein to Java, and in such localities large deposits of Guana occur. The latter, (“Ty Klawah” of the Malays, i. e. bats’ manure,) has been tried by agriculturists at Pinang, but has been found much less efficacious than the Guana obtained from the swift (*Collocalia*), producing the edible nests.

## FRUGIVORA.

GEN.—*PTEROPUS*, Brisson.

(1133e.) *PTEROPUS EDULIS*, Geoffroy.

SYN.—*Pteropus javanicus*, Desm. apud Horsfield.

*Pteropus Edwardsii*, Geoffroy.

“Kalong” of the Javanese.

“Kluang” of the Malays of the Peninsula.

HAB.—*Pinang, Singapore, Malayan Peninsula and Islands*. Java, Sumatra, Banda, Bengal. Assam.

GEN.—*CYNOPTERUS*, Fred. Cuvier.

(1133f.) *CYNOPTERUS MARGINATUS*, F. Cuv.

SYN.—*Vespertilio marginatus*, Buchanan Hamilton, MSS.

*Pteropus marginatus* Geoffroy.

*Pteropus titthæcheilus*, Temm.

*Pachysoma titthæcheilus*, Temm.

*Pachysoma brevicaudatum*, Is. Geoff.

*Pteropus brevicaudatus*, Schinz.

*Pachysoma Diardii*, Isid. Geoff.

*Pteropus Diardii*, Schinz.

*Pachysoma Duvaucellii*, Is. Geoff.

*Pteropus pyrivorus*, Hodgson, apud Gray.

HAB.—*Singapore, Pinang, Malayan Peninsula and Islands*. Java, Sumatra, Southern Mahratta Country, Bengal, Nipal.

The colour is very variable, not only individually, but according to age and sex, which has given rise to several supposed distinct species. But they all resemble each other in habits and dentition, they occupy one common place of rest, and their new-born, or very young, are of a uniform colour. The ears of the adult are, in all more or less distinctly margined with white.

1. *Cynopterus marginatus*. Back reddish, or brownish-grey; lighter underneath.

2. *Pachysoma titthæcheilus*.

3. *Pteropus brevicaudatus*. Male: back reddish or olive-brown; a tuft of hair on the sides of the neck, the chest, and the sides of the greyish abdomen rusty, or orange-coloured. Female: above yellowish, or greyish-brown; beneath lighter. In some individuals from Malacca, the flying membrane is of a light reddish-brown.

4. *Pachysoma Diardii*: Back greyish-brown; abdomen greyish, brown on the sides.

5. *Pachysoma Duvaucellii*: pale greyish brown.

The following is a description of a new-born.



the back and the posterior surface of the humerus and femur, were covered with dense, soft, short hairs, of a dark greyish-brown; all the rest of the body was naked, of a greyish-black colour. The eyelids were not yet separated. The joints of the bones of the extremities were cartilaginous. The nails of the thumb and index were developed, but the feet and nails of the toes had already attained the size of the adult. The tongue was considerably extensile. The teeth present were:

4	1—1	2-2
Incis. —	Canin. —	Mol. —
4	1—1	2-2

Entire length, one and four-eighth of an inch, of which the lightly projecting tail two-eighth inch. Extent of the flying membrane, six and four-eighth inches.

In an individual measuring two and four-eighth inches in length, with an extent of the membrane of nine inches, the face and the lower parts, excepting the throat, had become scantily covered with light brownish-grey, short hairs. The eyelids were separated. The shoulder, elbow, hip, and knee joints, had become ossified, the other joints still remaining cartilaginous.

#### INSECTIVORA.

GEN.—TUPAIA, *Raffles*.

(1133g.) TUPAIA FERRUGINEA, *Raffles*.

SYN.—“Tupai Press,” *Raffles* and *Horsfield*.

*Cladobates ferrugineus*, F. Cuv. apud *Schinz*.

*Sorex Glis*, *Diard* and *Duvaucel*.

*Glisorex ferruginea*, *Desmarest*.

*Hylogale ferruginea*, *Temminck*.

*Herpestes*, *Calcutta Journ. Nat. Hist.\**

\* Vol. II, p. 458, Pl. XIII½. The explanation accompanying this figure is as follows: “Searching for Col. Farquhar’s drawing of *Rhizomys Sumatrensis* already referred to, I found in the Society a drawing of a bushy-tailed *Herpestes*, differing nearly from Mr. Hodgson’s *Gulo Urva*, in having the tail of one uniform colour with the body, without the yellow tip. There is no name or letter on the drawing to shew from whence it came, and to prevent its following the fate of Colonel Farquhar’s *Rhizomys*. This is however incorrect. Pl. XIII½ represents no *Herpestes*: the elongated muzzle, the proximity of the large eye to the ear, which is exposed, and not hidden by the hairs of the cheek, are characters foreign to every known species of *Herpestes*. The draughtsman has very correctly represented a *Tupaia*, and the drawing, reappearing as a *Herpestes* in the *Calcutta Journal of Natural History*, has, by Mr. Blyth, been traced to be the original of Pl. IX, *Asiatic Researches*, Vol. XIV, where it properly accompanies the description of *Sorex Glis*, (i. e. *Tupaia ferruginea*) of M. M. *Diard* and *Duvaucel*.

“Tupai tana” of the Malays of Pinang.

HAB.—Pinang, Singapore, Malayan Peninsula. Sumatra, Java, Borneo.

The young of this very numerous species in hilly jungle, is easily tamed, and becomes familiar with its feeder, though towards strangers it retains its original mistrust, which in mature age is scarcely reclaimable. In a state of nature it lives singly or in pairs, fiercely attacking intruders of its own species. When several are confined together, they fight each other, or jointly attack and destroy the weakest. The natural food is mixed insectivorous and frugivorous. In confinement, individuals may be fed exclusively on either, though preference is evinced for insects; and eggs, fish, and earth-worms, are equally relished. A short peculiar tremulous whistling sound, often heard by calls and answers, in the Malayan jungle, marks their pleasurable emotions, as for instance, on the appearance of food, while the contrary is expressed by shrill protracted cries. Their disposition is very restless, and their great agility enables them to perform the most extraordinary bounds in all directions, in which exercise they spend the day, till night sends them to sleep in their rudely constructed lairs in the highest branches of trees. At times they will sit on their haunches, holding their food between the fore-legs, and after feeding, they smooth the head and face with both fore-paws, and lick the lips and palms. They are also fond of water, both to drink and to bathe in. The female usually produces one young; she has four mammae, the anterior pair of which is situated on the lower lateral part of the chest, the posterior on the side of the abdomen. On the lower surface of the tongue, the frenum is continued to within a short distance of the apex in a raised line, on either side of which the skin is thickened, fringed at the edges, and thus presenting a rudimentary sublingual appendage, somewhat similar to that observed in *Nycticebus tardigradus*; though in *Tupaia ferruginea* the fringes of the margin only are free, the rest being attached to the tongue, but easily detached by a knife. The lateral raised lines of the palms and soles, the posterior part of the first phalanges, and the third phalanx (second of the thumbs,) which is widened into a small soft disk, in fact all the points which rest upon the ground, are studded with little transversely curved ridges or duplicatures, similar to those observed under the toes, of some of the *Gekkotidae*, which fully account for the precision, the ‘aplomb,’ with which these animals perform the astounding leaps from below, barely touching with the soles the point d’appui above. In a cage, the Tupai will continue for hours vaulting from below, back downwards, poise itself for an instant, continuing back downwards under the horizontal roof, and regain the point of starting, and thus describe a circle—the diameter of which may be three to four times the length of the animal,—in far shorter time than is required for the description. In a young male, measuring from the nose to the

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root of the tail seven and three-fourth inches, the tail six and a half inches, the dimensions of the intestinal canal were :

Small Intestines, 3 ft.  $4\frac{1}{2}$  inch., diameter  $\frac{1}{8}$  inch.  
Large ditto,..... 0 „  $3\frac{3}{4}$  „ „  $\frac{1}{3}$  „  
Cæcum,..... 0 „  $0\frac{3}{4}$  „ „  $\frac{1}{16}$  „  
Costæ veræ : 8 pairs ; spuræi : 5 pairs = 13 pairs.

This species\* is infested with a tick of the following description : *Ixodes Tupaiæ*. Body suboval, shining dark-green olive ; scaly plate, palpi casing the pointed sucker, and the legs : pale reddish-brown. Length, when -wollen, three-eighth inch.

\* Single light coloured individuals of this species occur with the back, limbs and abdomen greyish, whitish, or isabella.

GEN.—GYMNURA, *Raffles*.

(1133h.) GYMNURA RAFFLESII, Vigors and Horsfield.

SYN.—*Viverra gymnura*, *Raffles*.

“Tikus ambang bulan,” *Raffles*.

HAB.—*Malacca*.

*Sumatra*, *Singapore*.

In a district not distant from *Malacca*, the animal is said to be numerous, though not to be seen in other localities.

GEN.—SOREX, *Linne*.

(1133i.) SOREX MURINUS, *Linne*.\*

\* The following Syn. are given in *Gray's List of Mam. in British Museum* : *Sorex myosurus*, *Pallas*. *Geoff. Ann. Mus. XVII. S. Sonneratii*, and *S. giganteus*, *J. Geoff. Mem. XV, S. indicus*, *Geoff. Mem. Mus. I. S. capensis*. *Geoff. Ann. Mus. XVII. S. Pilorides*, *Shaw. Mus. Liver. S. cærulescens*, *Shaw, Zool. S. crassicaudatus*, *Licht. Saugeth. S. nepalensis*, *Hodgson, S. moschatus*, *Robinson, Assam. Olivier, Voy. Buffon. H. N. Suppl. VII.*

SYN.—*Sorex myosurus*, *Pallas*, apud *Schinz*.

*Sorex cærulescens*, var, *Raffles*?

“Chinchorot” of the Malays of the Peninsula.

HAB.—*Pinang*. *Java*.

Dark brownish-grey above ; beneath light brownish-grey. Feet and tail flesh-coloured in the living animal, changing to cinereous after death. In the young the colour is more of a bluish-grey, slightly mixed with the brown on the back. Length of the head and body five and half inches ; tail three inches.

2	0	8.8
Incis. —	Canin. —	Molar, —
9	0	5.5

The present differs from the ‘Musk Shrew’ of Bengal (“Choochundr”) in its proportionally broader, more developed, and from the head more diverging ear, which characters also distinguish it from *Sorex nigrescens*, *Gray*, which it somewhat resembles in its colours. The smell of musk, emitted by the adult animal, and which in the young is barely perceptible, is much less intense than that of the Bengal Musk Shrew.

## CARNIVORA.

GEN.—URSUS, *Linne*.

HELARCTOS, *Horsfield*.

(1133j.) HELARCTOS MALAYANUS, *Horsfield*.

SYN.—*Ursus Malayanus*, *Raffles* and *Horsfield*.

“Bruang” of the Malays.

HAB.—*Malayan Peninsula*. *Sumatra*, *Tenasserim* Provinces, *Assam*, *Nipal*.

Colour of the young : snout and lips pale ferrugineous. Head, back, and outside of the limbs black, mixed with pale rust colour, in consequence of many of the black hairs having the point, or a part next to the point, of the latter colour. Ears, tail, paws, and inner side of the extremities shining black. The somewhat woolly hairs of the abdomen are faintly marked with ferrugineous, and are mixed with longer stiff black hairs. As observed by *Schinz*, the mark on the breast is very variable in its form. It may be compared to a crescent, assuming according to the smaller or greater breadth of the limbs, the shape of the letter U, of a horse shoe, or a heart. In the living animal it is of a pale rust, or orange colour, in some individuals with a few small blackish spots, fading after death to a yellowish-white. A very old male presented the following dentition :

6	1—1	4.4	(2 + 2)
Incis. —	Canin. —	Molar, —	
6	1—1	6.6	(3 + 3)

In a young female, three feet in length, the intestinal canal measured fifteen feet. It had neither cæcum nor valve to mark the transition. She had ten grinders in either jaw, of which four were spurious, six true.

GEN.—ARCTICTIS, *Temminck*.

(1133k.) ARCTICTIS BINTURONG, *Fisher*.

SYN.—*Viverra*? *Binturong*, *Raffles*.

*Paradoxurus albifrons*, *F. Cuvier*.

*Ictides ater*, *F. Cuvier*.

*Arctictis penicillata*, *Temminck*.

*Ictides ater*, *Blainv. Calcutta Journ. of Nat. Hist.\**

“Unturong” of the Malays of the Peninsula.

\* In the 3rd Vol. of *Calcutta Journ. of Nat. Hist.* p. 410, occurs the following passage : “The Binturong was first discovered in Java, but the first notice of its existence on the continent of India will be found in the second volume of this Journal, p. 457,” (sic!) “&c.” *Sir Stamford Raffles*, who published the first account of this animal, distinctly states, that it was discovered at *Malacca*, (not *Java*, as erroneously stated,) by *Major Farquhar*, and *Malacca* is situated on the continent of India as well as *Tenasserim*. The fact of its inhabiting *Bhotan*, was according to *Cuvier* (*Regne Animal*), first made known by *Duvaucel*, and the author of the article “*Ictides*” in the *Penny Cyclopædia*, 1838, gives *Mr. Hodgson*’s authority of the *Binturong*’s inhabiting



Nipal, (Kachar, though they occasionally occur in the central region of Nipal.)

“Unturong” of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. Tenasserim, Arracan, Assam, Bhotan, Nipal.

Java and Sumatra are quoted by M. Schinz, but neither Dr. Horsfield, Sir S. Raffles, nor M. Temminck, (*Discours Preliminaire, Fauna Japonica*), mention the *Binturong* as inhabiting either of the two islands.

The general colour of either sex is black, sprinkled on the body and extremities with pale ferrugineous, produced by some of the hairs having a part next to the point of that colour. In both sexes nearly all the hairs of the head, face and throat are thus marked, which communicates to these parts a whitish or greyish appearance. In the young of either sex there is a faint trace of a white spot over the eyes. The long ear tufts are always black, the margin of the auricle being either white, or pale rust-coloured. The tail is black, but the hairs of the anterior or basal half, are whitish at the root, or in some uniformly of that colour. The pupil is vertically contracted by the influence of light; the iris is of a beautiful Van Dyke brown. In its habits the *Binturong* is both arboreal and terrestrial, and nocturnal, sleeping till the sun is below the horizon, when it displays great agility in searching for smaller quadrupeds, birds, fishes, earth-worms, insects and fruit. The howl is loud, resembling that of some of the *Malayan Paradoxuri*. The young are easily tamed, but the old animal retains its natural fierceness. Between the anus and penis is situated a large pyriform gland, exceeding two inches in length, partially divided by a deep naked fossa, commencing from the latter organ. The gland secretes a light-brown oily fluid, of a peculiar intense, but not fetid or sickening odour. In a young male, measuring from the nose to the root of the tail, two feet three and five-eighth inches, the tail two feet two and a half inches, the intestines were of the following dimensions:

Small Intestines,..... 7 feet 11 inches.

Large do..... 1 foot 10 inches.

Cæcum,..... 0  $\frac{1}{2}$  inch.

The circumference of the small intestines about seven eighth inches; of the large but little more, but the rectum was thickened two inches in circumference.

The short cæcum is crescent-shaped, or lengthened pyriform. The stomach is remarkably lengthened cylindrical, the parietes much thickened towards pylorus. Oesophagus enters close to fundus ventriculi, in consequence of which there is but a slight difference between the curvatures.

Length along the greater curvature, 1 foot 2 ins.  
“ smaller „ 1 „ 1 „

The circumference from cardia round fundus ventriculi measured five and a half inches; round pylorus two six-eighth inches. Both the gall-

bladder and the spleen presented a remarkably elongated shape. The former organ, lengthened pyriform, measured in length two inches; ductus cysticus two and a half inches. The spleen, tapering to a narrow point, was half an inch broad, and eight and a half inches in length. Costæ veræ, nine pairs; spuræ, five pairs = fourteen pairs.

GEN.—*MUSTELA*, Linnæ.

*PUTORIUS*, Cuvier.

(1133l.) *PUTORIUS NUDIPES*, Fred. Cuvier.

SYN.—*Mustela nudipes*, Desmar. apud Schinz.

“Pulasan” of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. Sumatra, Borneo.

The muzzle and the soles of the feet are pale flesh-coloured. The animal is said to inhabit the densest jungle, and is most difficult to obtain.

*MUSTELA*, Cuvier.

*MUSTELA FLAVIGULA*, Boddaert.

SYN.—*Viverra quadricolor*, Shaw.

*Marte a gorge doree*, Desmarest.

*Mustela Hardwickii*, Horsfield.

*Martes flavigula*, Hodgson, apud Gray.

“Anga Prao” of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. Java, Sumatra, Nipal.

The Malayan individuals differ from those from Northern India, originally described, in having the fur shorter and less dense, the head pale-brown, the neck and back pale yellowish-brown, becoming darker towards the tail, which, as well as the posterior extremities, is black. The anterior extremities are greyish-brown; the feet and the streak behind the ear deep brown; the lips whitish; the throat and chest yellowish-white or ochreous; the scanty hairs of the abdomen pale brownish.

GEN.—*LUTRA*, Storr.

(1133m.) *LUTRA NAIR*, Fred. Cuvier.

SYN.—*Lutra indica*, Gray.

“Anjing Ayer” of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. China, Bombay, South Mahratta Country.

(1133n.) *LUTRA BARANG*, Raffles.

SYN.—“Barang Barang” or “Ambrang,” Raffles.

*Lutra leptonyx*, Wagner, apud Schinz.

*Lutra Simung*, Schinz?\*

“Mumrang” or “Amrang” of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. Sumatra, Borneo.

\* In Schinz’s diagnosis of *Lutra Simung* is said “ungvibus robustis falcularibus,” (“die Nagel an den zehen sind stark und gekrümmt”) which if the passage refers to *Lutra leptonyx*, Horsfield, must be a mistake, as the original diagnosis expressly states “ungvibus brevibus sublamnaribus.” As Schinz describes *Lutra Barang* “ungvibus minutissimis obtusis” *Lutra*

# MAMMALIA OF MALAYAN PENINSULA AND ISLANDS.

*leptonyx* is probably meant, and thus the one species is mistaken for the other.

The young are very playful, and soon become sufficiently domesticated to roam about the house, and to appear when called. Its voice is a short shrill whistling, not unlike the sound of the cricket, but stronger. Its food is not confined to fishes and crustacea; birds and insects are equally relished. The muzzle is hairy, but in the old animal the hairs become rubbed off. The Malayan individuals appear to attain to a greater size than the Sumatran, described by Raffles. An old male measured from the apex of the nose to the root of the tail two feet eight and a half inches; the tail one foot eight inches. In a young male two feet and two inches, and the tail one foot two-eighth of an inch in length, the simple intestinal canal measured nine feet and one inch, with a circumference throughout of about two and two-eighth inches. No cæcum. Each of the kidneys consisted of ten loosely connected glands.

AONYX, Lesson.

(1133o.) AONYX LEPTONYX, Gray: List.

SYN.—*Lutra leptonyx*, Horsfield.

*Lutra cinerea*, Illiger.

*Lutra perspicillata*. Is. Geoff.

*Mustela Lutra*, Marsden.

*Aonyx Horsfieldii*, Gray.

*Lutra Barang*, apud Schinz?

"Anjing Ayer" of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. Java, Sumatra, Singapore, Nipal.

This, as well as the two preceding species, inhabits numerous the banks of the Malayan rivers, and all are at times used by the Malays in river fishing.

GEN.—CANIS, Linne.

CUON, Hodgson.

(1133p.) CUON PRIMÆVUS, Hodgson.

SYN.—*Canis primævus*, Hodgson.\*

\* Mr. Ogilby considers *Canis Dukhunensis*, Sykes, and *Canis primævus*, Hodgson, to be identical, and apparently not different from *C. Sumatrensis*, Hardwicke, (*Mem. on the Mammalogy of the Himalayahs*, apud Royle.) Colonel Sykes, on the contrary, describes *C. Dukhunensis* as being "essentially distinct from *Canis Quao*, or *Sumatrensis*, Hardwicke."

*Chrysæus primævus*, Hamilton Smith.

*Chrysæus socatus*, Cantor.

"Anjingutan" of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. Bengal Nipal.

Some slight differences occur in the Malayan individuals. The inferior surface, the inside of the ears and limbs, the lip and throat, are of the same colour as the back, but much paler. A black carpal spot, like that of the wolf, is very distinct in the male, less so in the female. The young animal of either sex has a faint white spot with a

few blackish bristles, situated nearly midway between the angle of the mouth and the ears. Of the wavy wool of the Buansu, the Malayan wild dog, inhabiting a tropical climate, has but a little on the inner side of, and immediately behind the ear; the posterior part of the abdomen is almost naked. The short bristles of the lips, cheeks, throat, and above the eyes, are all black. In habits, so fully described by Mr. Hodgson, and in size, the Malayan agrees with the Nipalese. In a young male, from the nose to the root of the tail two feet height and a half inches in length; the tail one foot, the intestinal canal was of the following dimensions:

Small Intestines,..... 6 feet 2 inches.

Large, ditto,... .. 0 ,, 10½ ,,

Cæcum,... .. 0 ,, 4 ,,

The latter intestine is spiral, much widened at the origin.

Costæ veræ 8 pairs, spuriae 5 pairs=13 pairs.

The Malays mention another, black wild dog ("Anjing utan etam,") as also inhabiting the densest jungle. A Hyena is also reported to occur on the Peninsula.

Mongrel curs, "pariah dogs," of every description, infest every village, but apparently not uninhabited places, nor localities far distant from the dwellings of man. As they all may be said to be in a state of half domestication, and are of forms very different from the wild dog, which shuns the human presence, their origin cannot with certainty be traced to the Malayan Peninsula.

GEN.—VIVERRA, Linne.

(1133q.) VIVERRA ZIBETHA, Linne.

SYN.—*Viverra undulata*, Gray.

*Viverra melanurus*, Hodgson.

*Viverra orientalis*, Hodgson.

*Viverra civetoides*, Hodgson.

Undescribed Civet, McClelland.

} Apud  
Gray:  
List.

"Tangallong" of the Malays of the Peninsula.

HAB.—*Pinang, Singapore, Malayan Peninsula*. Southern China, Siam, Bengal, Khasyah Hills, Nipal.

Judging by the comparatively few individuals observed in the Straits of Malacca, this species would appear to be far less numerous, than the following. Of several, the largest, which was a female, measured from the apex of the nose to the root of the tail two feet and eight inches; the tail one foot height and a half inches.

(1133r.) VIVERRA TANGALUNGA, Gray.

SYN.—*Viverra Zibetha*, Lin. apud Raffles.

"Tangalung," Raffles.

*Viverra Zibetha*, Lin. apud Horsfield.

*Viverra Zibetha*, apud Fred. Cuvier.

*Viverra Zibetha*, Lin. apud Schinz.\*

"Musang jebat" of the Malays of the Peninsula.

\* The true *Viverra Zibetha*, Linne, is quoted by Schinz under the denominations of *V. ben-*



# MAMMALIA OF MALAYAN PENINSULA AND ISLANDS.

*galensis*, Hardwicke (?), and *V. melanura*, Hodgson.

HAB.—*Pinang, Singapore, Malayan Peninsula, Sumatra, Borneo, Celebes, Amboyna, Philippines.*

This species is readily distinguished from *V. Zibetha* by a continuous longitudinal black band occupying the upper surface of the tail, the numerous irregular rings being separated only on its inferior half. (Gray: Proceed. Zool. Society, 1832, p. 63.) The number and distance of the half rings on the lower surface of the tail, vary in different individuals, some of which have either the entire tail, or the anterior half or third of the tail, thus marked, the rest being black. The very young animal is generally of a much darker ground colour than the adult, and the black marks are therefore less conspicuous. Under certain lights the colour appears uniformly black. *Viverra Tungalunga* and *Zibetha*, however similar in habits and general colours, neither live nor breed together. Placed side by side, the living animals present a marked dissimilarity of countenance, which although obvious to the eye, would be most difficult, if possible at all, to convey in words. The female has three pairs of mammae, and produces from one to three young. The Malays of the Peninsula distinguish by different names the *Zibetha* and the *Tungalunga*, but as they suppose the civet of the former species to be of better quality, perhaps because it is scarcer, they will frequently offer for sale individuals of the latter, exceedingly numerous species, imposing upon it the name of *V. Zibetha*: "Tanggalong" of the Peninsula. The largest individual of the present species observed, measured in length from the apex of the nose to the root of the tail three feet and one inch; the tail one foot five and a half inches. In a young, a female, three feet five and a half inches in length, of which the tail one foot and one inch, the intestinal canal was of the following dimensions:

Small Intestines,..... 7 feet 5 inches.  
Large ditto,..... 0 „ 9 „  
Cæcum, ... .. 0 „ 1 „  
Costæ veræ, seven pairs; spuræ, six pairs  
=thirteen pairs.

VIVERRICULA, Hodgson.

(1133s.) VIVERRICULA MALACCENSIS.

SYN.—*Viverra malaccensis*, Gmelin.

*Viverra Rasse*, Horsfield.

*Viverra Gunda*, Buchanan Hamilton MSS.

*Viverra indica*, Geoffroy

*Viverra bengalensis*, Gray: Illustr.

*Viverra pallida*, Gray: Illustr.

*Genetta Manillensis*, Eydoux.

HAB.—*Malayan Peninsula. China, Philippine Islands, Java, Singapore, Cochin China, Tenasserim Provinces, Bengal, Nipal, Hindoo-stan, Dukhun, Bombay.*

On the Malayan Peninsula this species appears to be more numerous than *V. Zibetha*; less so

The largest observed was three feet four inches in length, of which the tail one foot three and a half inches. In a male, measuring from the apex of the nose to the root of the tail, two feet and three-fourth of an inch, the tail one foot one inch, the dimensions of the intestinal canal were:

Small Intestines,.. .. 4 feet 0 inch.

Large ditto,..... 0 „ 8 „

Cæcum,..... 0 „ 0½ „

The three preceding species have the following characters in common. The pupil is vertical, oblong; the iris of a rich brown. They are arboreal as well as terrestrial, preying upon the smaller quadrupeds, birds, fish, crustacea, insects and fruit. Naturally very fierce, they are scarcely reclaimable except in youth, but with age the original disposition returns. Their voice is peculiar, hoarse and hissing.

GEN.—PRIONODON, Horsfield.

(1133t.) PRIONODON GRACILIS, Horsfield.

SYN.—*Viverra?* Linsang, Hardwicke.

*Felis gracilis*, Horsfield.

*Viverra* Hardwicke, Lesson.

*Viverra gracilis*, Desmarest, apud Schinz.

*Linsang gracilis*, Muller, apud Gray.  
List, and Schinz.

HAB.—*Malayan Peninsula. Java, Sumatra, Borneo, Siam.*

The ground colour is buff, and the dark marks are of a deep snuff colour, inclining to black with purple reflection. Length from the apex of the nose to the root of the tail: one foot six inches, the tail one foot three six-eighth inches.

Mr. Rappa, for many years a dealer in objects of natural history at Malacca, who previously had been supplied with a figure and description of *Prionodon gracilis*, reported in a memorandum accompanying the specimen, that it had been captured in the jungle at some distance from Malacca. It was unknown to himself and to the natives. At first the animal was fierce and impatient of confinement, but by degrees it became very gentle and playful, and when subsequently suffered to leave the cage, it went in search of sparrows and other small birds, displaying great dexterity and unerring aim in stealthily leaping upon them. Fruit of every description it refused. Another younger individual was captured about the same time, but contrived to make its escape.

GEN.—PARADOXURUS, Fred. Cuvier.

PAGUMA, Gray.

(1133u.) PAGUMA LEUCOMYSTAX, Gray: List?

SYN.—*Paradoxurus leucomystax*, Gray?

*Amblyodon auratus*, Jourdan?

"Musang bulan" of the Malays of the Peninsula.

HAB.—*Malayan Peninsula. Singapore, Sumatra.*

In a single individual observed, the hairs of the body, limbs and anterior third of the tail, are greyish-yellow at the base, next bright rust co-

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duces a mixture of ferruginous and black, the latter prevailing on the nape of the neck, middle line of the back, and the anterior third of the tail. The hairs of the vertex and the ridge of the nose are dark at the base, with yellowish points. The large oblique whitish spot in front of the ear, produced by uniformly whitish hairs, is on either side blended with the whitish vertex and ridge of the nose, and is continued down the sides of the neck, forming a large broad arrow-shaped mark. The orbits are dark brown, the face, lips and throat pale brown. The long rigid white whiskers are mixed with a few shorter black bristles. The feet are dark brown, the posterior two-thirds of the tail uniformly black. The lower surface and the inner side of the extremities are pale ferruginous. From the apex of the nose to the root of the tail: two feet three inches, the tail one foot eight inches.

(1133v.) *PAGUMA TRIVIRGATA*, Gray: List.  
 SYN.—*Viverra trivirgata*, Reinwart, Mus. Leyd.  
*Paradoxurus trivirgatus*, Gray.

“Musang akar” of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. Singapore, Tenasserim.

The ground colour varies from yellowish, or brownish, to blackish-grey. Fur short, peculiarly soft, silky. The dorsal streaks are either continued, undulated, (the central nearly always,) are composed of separate black spots. Some individuals have a short white streak on the ridge of the nose. The largest male measured from the apex of the nose to the root of the tail, two feet two and a half inches; the tail two feet three inches.

(1133w.) *PARDOXURUS MUSANGA*, Gray.  
 SYN.—*Viverra hermaphrodita*, Pallas, apud Schinz.

*Viverra fasciata*, Gmelin?

*Viverra Musanga*, Marsden, Raffles.

*Musangbulan*, Raffles.

*Viverra Musanga*, Var. *javanica*, Horsfield.

*Ichneumon prehensilis*, Buchanan Hamilton M.S.S.

*Platyschista hermaphrodita*, }  
 Otto.

*Paradoxurus Pallasii*, Gray. } apud

*Paradoxurus Crössii*, Gray. } Schinz.

*Paradoxurus dubius*, Gray. }

*Paradoxurus Musangoides*, Gray.

*Paradoxurus typus*, apud Schlegel.

*Paradoxurus felinus*, Wagner, apud Schinz.

“Musang” or “Musang Pandan,”  
 (when the tail is with white point:  
 “Musang Bungkwang,”) of the Malays  
 of the Peninsula.

HAB.—*Pinang, Singapore, Malayan Peninsula*.  
 Java, Sumatra, Borneo, Timor.

The ground colour and dorsal marks of this exceedingly numerous species are liable to considerable variations, the principal of which are

noted by Schinz: individuals occur (probably of every species) with the apex of the tail white, with elongated white spots on the abdomen, with the tail spirally twisted. In most the dorsal marks become indistinct, or invisible in certain lights. The female has from one to three young, of colours similar to the adult, but less distinct, their fur is softer, somewhat woolly, mixed with longer stiff black hairs. The young is tamed without difficulty, and is sometimes kept in houses to destroy rats and mice. The *Paradoxuri* are in habits like the Civets. They have an elliptical pupil, vertically contradicted by the influence of light. Their glandular secretion is of a peculiar, not civet or musk-like odour. The largest specimen of a great number, measured from the apex of the nose to the root of the tail two feet and half an inch; the tail one foot four and a half inches. In a male, measuring three feet one and a half inch in length, of which the tail one foot four and a half inches, the intestinal canal were of the following dimensions:—

Small Intestines,..... 5 feet 8 inches.

Large ditto, ..... 0 „ 5 „

Cæcum,..... 0 „ 1½ „

Costæ veræ, seven pairs, spuræ, six pairs = 13 pairs.

(1133x.) *PARADOXURUS* (?) *DERBYANUS*, Gray.  
 SYN.—*Paradoxurus*? *Zebra*, Gray.

*Hemigalea Zebra*, Jourdan.

*Viverra Boiei*, Muller.

“Musang Batu” or “Sangah Prao” of  
 the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. Borneo.

The ground colour varies from pale ochreous to buff, and the dark marks in shape and number scarcely alike in any two individuals, from snuff colour to black. The species apparently not numerous, and is celebrated among the Malays for its great agility. It is said chiefly to feed upon the larger birds, such as the Argus pheasant, which it will hunt down, following its prey till the strength of the latter is exhausted, when it falls an easy victim to the indefatigable pursuer. The slender vermiform make the countenance and distribution of colours; the serrated, flattened false molars; the soles, hairy between and under the toes, and slightly in the centre; the somewhat removed thumb, are characters by which this animal differs from *Paradoxurus*, and form a link between that genus and *Prionodon* in the same manner that *Viverricula* connects *Viverra* to *Prionodon*. The largest male observed measured from the apex of the nose to the root of the tail two feet; the tail one foot and four inches.

GEN.—*CYNOGALE*, Gray.

(1133y.) *CYNOGALE BENETTII*, Gray.

SYN.—*Viverra* (*Limictis*) *carcharias*, Blainville.

*Potamophilus barbatus*, Kuhl.

*Cynogale barbata*, Schinz.



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**HAB.**—*Malayan Peninsula*. Sumatra, Borneo.

The very young, of which two individuals, a male and a female, were found with the mother, differ from the adult in having a very soft, silky, dense fur, mixed with longer hairs, which are black, except on the chest and abdomen, where the apex is silvery. Over the tarsus and on the upper surface of the feet some of the hairs have a subterminal white band, close to the black apex. The posterior margin of the ear is hairy and of a silvery colour. This animal appears to be of rare occurrence on the Malayan Peninsula, and the natives are consequently not acquainted with it. The largest male examined measured from the apex of the nose to the root of the tail two feet three inches; the tail eight inches.

**GEN.**—*HERPESTES*, Illiger.

(1133z.) *HERPESTES JAVANICUS*, Desmarest.

**SYN.**—*Ichneumon Javanicus*, Geoffroy.

*Mangusta Javanica*, Horsfield.

"Garangan," Horsfield.

**HAB.**—*Pinang, Malayan Peninsula*. Java.

The species is numerous. The largest male measured from the apex of the nose to the root of the tail one foot four and half inches; the tail one foot one and a half inch.

(1133aa.) *HERPESTES AUROPUNCTATUS*, Hodgson.

**SYN.**—*Mangustus auropunctata*, Hodgson.

*Herpestes nepalensis*, Gray.

*Herpestes Edwardsii*, apud Ogilby (?)

*Herpestes javanica*, Hodgson, apud Gray : List.

**HAB.**—*Malayan Peninsula*. Bengal, Nipal, Scinde, Afghanistan.

This species somewhat resembles *H. Javanicus*, but the ground colour is lighter, and the lower surface uniformly pale yellowish-grey; whereas in the former species it is similar to the back, or a shade paler. A single female observed, measured from the apex of the nose to the root of the tail one foot one inch; the tail nine inches.

(1133bb.) *HERPESTES GRISEUS*, Desmarest.

**SYN.**—*Ichneumon griseus*, Geoffroy.

*Mangouste de Malacca* F. Cuvier. }

*Mangusta malaccensis*, Fischer, }

*Mangusta grisea*, Fischer, }

*Herpestes Edwardsii*, Fischer, }

*Mangusta Nyula*, Hodgson, }

*Herpestes griseus*, Nyool, apud Ogilby, }

*Herpestes pallidus*, Schinz, }

Forsan *H. nipalensis*, Gray, Var. apud Schinz.

**HAB.**—*Malayan Peninsula*. Bengal, Hindoo-stan, Scinde, Nipaul.

The present differs from the other species not only by its grey colour, but by its broader head, particularly between the prominent eyes, and by its shorter, blunter nose, which places the eyes comparatively nearer to the muzzle. In a single female, measuring from the apex of the nose to

es, the tail nine and a half inches; the intestinal canal was of the following dimensions :

Small Intestines, ... 3 feet  $1\frac{1}{2}$  inch.

Large do. ... 0 ..  $5\frac{1}{4}$  ..

Cæcum, ... 0 .. 1 ..

By a contraction in the middle of the greater curvature, the stomach is distinctly separated into a cardiac and pyloric cavity.

(1133cc.) *HERPESTES BRACHYURUS*, Gray.

**SYN.**—"Musang Turou" of the Malays of the Peninsula.

**HAB.**—*Malayan Peninsula*.

The largest male measured from the apex of the nose to the root of the tail one foot six and a half inches, the tail nine inches. It is distinguished from the other species, not only by its colours and comparatively short tail, but by its larger size and much more robust make.

**GEN.**—*FELIS*, Linne.

(1133dd.) *FELIS TIGRIS*, Linne.

**SYN.**—*Tigris regalis*, Gray : List.

"Harimau" or "Rimau" of the Malays.

**HAB.**—*Malayan Peninsula*. India.

Lieut. Colonel James Low has communicated the following denominations, by which the Malays of the Peninsula distinguish different varieties.

"Rimau Sipai," reddish coated, striped.

"Rimau Ballu," darker coloured.

"Daun Pinang," reddish coated, without stripes.

"Tuppu Kassau," darkish, without stripes, but with longer hairs than the others.

"Puntong Prun," very dark, striped.

(1133ee.) *FELIS LEOPARDUS*, Schreber.

**SYN.**—*Felis Pardus*, Linne?

*Felis varia*, Schreber,

*Felis Panthera*, Erxleben,

*Felis chalybeata*, Hermann,

*Felis antiquorum*, Fischer,

*Felis fusca*, Meyer,

*Felis Nimr*, Ehrenberg,

*Leopardus varius*, Gray : List.

*Felis Leopardus*, apud Schinz.

"Rimau Bintang" of the Malays of the Peninsula.

**HAB.**—*Malayan Peninsula*. India.

**DARK VAR.**

**SYN.**—*Felis melas*, Peron, apud Gray : List.

"Rimau Kumbang,"\* of the Malays of the Peninsula.

\* "Kumbang" signifies a beetle; applied *par excellence* to a species of *Oryctes*, resembling *scarabeus nasicornis* Linne, which is very destructive to cocoanut plantations. "Rimau Kumbang," Raffles, is by Schinz referred to *Felis Pardus*, Temminck, *Var. nigra*, Muller; *Felis melas*, F. Cuvier, the habitat of which is said to be Java and Sumatra.

The ground colour is a shining beetle brown, mixed with white hairs, not however sufficiently to impart a grey appearance. The black spots

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The skin of a male killed at Malacca, measured from the nose to the root of the tail four feet four and a half inches, the tail two feet ten and a half inches.

The Leopards of the Malayan Peninsula appear to attain to a larger size, and to be more ferocious than is generally the case in India. Instances of their having killed and carried off Malays are on record.

(1133ff.) *FELIS MARMORATA*, Martin.

SYN.—*Felis Diardii*, Fischer, apud Schinz.

*Felis Diardii*, apud Jardine. Tal 21 and 22.

*Leopardus marmoratus*, Gray: List.

“Rimau dahan” of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*.

The ground colour varies from rusty-grey, or fulvous to grey, and the black markings are scarcely quite alike in any two individuals, nor is the extremity of the tail constantly black. The adult exceeds the size given in the original description; a female measured from the apex of the nose to the root of the tail two feet half an inch; the tail one foot nine inches. The species is numerous.

(1133gg.) *FELIS JAVANENSIS*, Desmarest.

SYN.—*Felis Javanensis*, Desmarest, apud Horsfield.

“Kuwuk,” Horsfield.

<i>Felis minuta</i> , Temminck	} Apud Schinz.
<i>Felis servalin</i> , Temminck,	
<i>Felis sumatrana</i> , Horsfield,	
<i>Felis undata</i> , Desmarest,	
<i>Felis Diardii</i> , Griffith,	} Apud Gray: List.
<i>Leopardus Javanensis</i> ,	

“Rimau akar” of the Malays of the Peninsula.

HAB.—*Pinang, Malayan Peninsula. Java, Sumatra?*

The ground colour in the Malayan individuals varies from pure grey to greyish brown or ferruginous. The largest adult male measured from the apex of the nose to the root of the tail one foot eleven and a half inches, the tail ten inches; another of equal dimensions of the body had the tail eight inches in length. The intestinal canal was of the following dimensions:

Small Intestines, ... 3 feet 8 inches.

Large, ... 0 „ 9½ „

Cæcum, ... 0 „ 1½ „

In the scansorial habits of this very numerous species originates its local denomination “akar,” signifying a climber as well as a root.

(1133hh.) *FELIS PLANICEPS*, Vigors and Horsfield.

SYN.—*Chaus* (?) *planiceps*, Gray: List:

“Kuching-utan,” or “Jalang” of the Malays of the Peninsula.

HAB.—*Malayan Peninsula. Sumatra, Borneo.*

The Malayan individuals of this apparently not numerous species differ from the Sumatran,

originally described, in having the whitish throat, chest and abdomen, and the inner side of the limbs undulated with brown, transversal, interrupted bands. In none of the Malayan wild cats is the length of the tail more variable. In a male, measuring from the apex of the nose to the root of the tail two feet one and a half inch, the tail, consisting of twelve gradually diminishing caudal vertebræ, measured five and a half inches; in another, one foot ten and three-fourth inch in length from the nose to the root of the tail, the latter organ measured two inches, consisting of four slightly decreasing vertebræ, the last one of which was broad, flattened, and rounded at the posterior extremity. It is of most ferocious habits, and untameable. In the smaller individual the intestinal canal was of the following dimensions:

Small Intestines, ... 3 feet 6½ inches.

Large, ... 0 „ 5½ „

Cæcum, ... 0 „ 0½ „

*FELIS DOMESTICA*, Auct.

“Kuching” of the Malays.

The Malays, like most Muhamedans, are as partial to cats as they are the reverse to dogs. As observed by Sir S. Raffles, some of the Malayan, like the Madagascar domesticated cats, have a short twisted or knobbed tail, others are tailless. Among those of an uniform colour, a light ashy and a bluish (or slaty grey) variety, with single longer black hairs on the back and tail, are conspicuous. They frequently relapse from a state of domestication, resort to the jungle, and shun the presence of man.

RODENTIA.

SCIURIDÆ.

GEN.—*SCIURUS*, Linne.

(1133ii.) *SCIURUS BICOLOR*, Sparrmann

SYN.—Das Javanische Eichhorn, Schreb\* apud Horsf.

<i>Sciurus giganteus</i> , McClell-	} Apud Horsfield, Proc. Zool. Soc.
<i>Sciurus bicolor</i> , Sparrmann,	
<i>Sciurus madagascariensis</i> .	} Apud Gray: List.
<i>Sciurus macrotoides</i> , Hodgson.	

“Chingkrawa etam” of the Malays of the Peninsula.

\* *Sciurus Javensis*, Schreber, and *bicolor*, Sparrmann apud Gray: List, is *Sciurus Leschenaultii*, Desmar, apud Horsfield. Syn. *S. hypoleucus*, Horsfield.

HAB.—*Penang, Malayan Peninsula. Java, Sumatra, Borneo, Siam, Tenasserim, Assam, Nipal.*

The original diagnosis will prevent misunderstanding as to the species under consideration. “*Sciurus supra niger, infra fulvus, auriculis acutis imberbibus, palmarum angue pollicari magno rotundato.*” (Sparrmann, apud Horsfield.) The colour of the head, back, tail, outside of the extremities, and the feet, is intense shining



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black, the single hairs being blackish-grey at the root, those of the tail blackish-brown at the root. In some individuals the black hairs generally, in others those of the tail, or some part of the back only, have a broad subterminal band of bright cinnamon, or Indian red, which imparts a red-dish tint to the general black colour. The mustachios, whiskers and the superciliary bristles are black; those of the throat and forearm are black in some, ferruginous, or with the apex of that colour, in others. The under-parts vary from a deep golden fulvous to isabella colour. Whatever be the prevailing shade, it is always most distinct on the lateral line, which, commencing from the cheeks, passes along the sides of the body. The fur of the lower parts of the body, and of the inside of the extremities, is much shorter, softer, and less dense, than that of the back. The single hairs are greyish, or blackish at the root, with the apex of the shade of yellow prevailing in the individual. Single long bristles, either uniformly, or partially black, or fulvous, appear on the chest and abdomen. The species, under the present garb, is very numerous in the Malayan forests and hills.

## VAR. B. Horsfield.

"*Sciurus supra fuscus, varians a fusco-nigricante ad sordide fulvum, pilis velleris fulvis et canescentibus intermixtis, subtus fulvus vel pallide flavescens.*"—Horsfield.

SYN.—*Sciurus auriventer*, Is. Geoff. apud Schinz.  
*Sciurus aureiventer*, Is. Geoff. apud Gray : List.

"Chingkrawah" or "Chingkrawah puteh" of the Malays of the Peninsula.

Single individuals, resembling the Javanese one figured in '*Zoological Researches in Java*,' occur at Penang, but there, as in Java, tawny of different shades, with a greyish cast, is more frequent. In some the head is of a darker colour, in others large spots of dark appear on the back, or the tail is above barred with dark. The upper part of the nose, a ring encircling the eyes, and the ears appear in all individuals to be of a darker brownish colour, and all have a more or less distinct large white spot on the anterior and upper part of the thigh. The back of the feet is either dark brown or fulvous. The palms, soles, mammae and genital organs, are black in all.

The single hairs of the back are greyish-brown at the root, darker than the apex, which imparts the general colour to the back. With the hairs of the tail the reverse is the case, the basal half being isabella or white; the apical darker. On the lower surface of the distichous tail, the roots of the hairs form a white line on either side of the vertebræ, which are covered with short, dark-brownish, or fulvous hairs. The under-parts of the body are of the same colours as those of the black-coated animal, but their roots are yellowish-white. The mustachios, whiskers, and other bristles, are in all of a black-

ish-brown; but the single bristles of the abdomen are sometimes fulvous.

The black-coated individuals stand in a similar relation to the light coloured varieties, as that in which the black-coloured *Hylobates Lar* stands to the light-coloured. Such differences of colour, wide no doubt, are of no uncommon occurrence among the Malayan Mammalia, and ought to be well considered by Zoologists, who have not the opportunity of studying the living animals.

This, as well as the rest of the Malayan squirrels, is capable of being tamed to a certain extent, and evinces attachment to those who feed them, but the appearance of a strange person, animal, or even an unusual sound, startles them, and recalls their natural shyness. The largest of a great number, measured from the apex of the nose to the root of the tail one foot six inches, the tail one foot nine and a half inches. The intestinal canal was of the following dimensions :

Small Intestines,.....	9 feet 6 inches.
Large do. ....	4 „ 9 „
Cæcum,.....	1 „ 2 „

(1133jj.) *SCIURUS RAFFLESII*, Vigors and Horsfield.

SYN.—*Sciurus rufogularis*, Gray.

*Sciurus rufoniger*, Gray.

*Sciurus Prevostii*, Desmar, apud Schinz.

"Tûpai balang" of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. Java, Borneo, China\* (Canton.)

\* China is the habitat assigned to *Sciurus rufogularis*, Gray. Without doubting the authenticity, it is perhaps as well to observe, that skins of the more showy animals and birds of India, Malacca, and the Indian Archipelago, are offered for sale as indigenous productions in the shops of Canton and Macao. Skins of *Halcyon Smyr-nensis* for instance, and other birds from different parts of India, are bought up by the Chinese merchants of our colonies in the Straits of Malacca, who annually, on Chinese Junks, ship quantities of considerable value to China, where they are manufactured into fans and artificial flowers. In a list of birds, contained in a collection of Chinese productions, exhibited in London in 1842, Mr. H. E. Strickland observes in his communication to the Zoological Society, that some of them appear to have been imported from Malacca. Skins and other parts of a host of animals, from the most distant parts of Asia, form items in the Chinese Pharmacopœia. On my visits to Chinese Dispensaries in China and in our Malayan Colonies, I have been shewn horns of rhinoceroses and deer, tusks of the Duyong, heads of Bucer, tortoise-shells, and well preserved skins of *Trigonocephalus Blomhoffii*, from Japan; Ammonites and other fossils, *cum multis aliis*, all supposed to possess specific

virtues, and accordingly prescribed by Chinese Medical practitioners.

This species, numerous in the Malayan countries, occurs with the following individual variations of colour—

Cheeks and throat iron-grey, shoulders uniformly, or mixed with red. (*Sciurus rufogularis*, Gray, *Mag. Nat. Hist.* 1842, p. 263.)

The cheeks are sometimes dark-brown, or ferruginous.

In some, the white lateral line commences from the side of the nose, passing over the cheeks, the side of the neck, and over the shoulder. The lateral line is either pure white, more or less distinct, or mixed with single longer hairs with black apex.

Some have a short black line immediately below the white; in others there is above the latter a grizzled line, sometimes continued over the outside of the thigh. The tail is seldom uniformly black, frequently partially black, reddish or grizzled, owing to the apex of the hairs being white. The tuft is frequently reddish or rust-coloured.

The feet are sometimes white or pale ferruginous.

The Museum of the Asiatic Society possesses a specimen from Java, differing from *Sciurus rufoniger*, Gray, in having the tail grizzled instead of black. *Sciurus redimitus*, Van der Boon, is probably another variety of *S. Rafflesii*.

A young male, about a fortnight in confinement, after having finished his usual meal of coconut, seized and devoured an *Iora typhia*, which had just been shot, and happened to be placed within reach. Sparrows and other smaller birds were subsequently eaten, and apparently relished.

The largest male measured from the apex of the nose to the root of the tail eleven and a half inches; the tail one foot two inches.

(1133kk.) *SCIURUS HIPPIURUS*, Is. Geoffroy.

SYN.—*Sciurus erythræus*, Pallas (?) } Apud  
*Sciurus caudatus*, McClelland ? } Gray:  
*Sciurus anomalus*, Kuhl. } List.  
*Sciurus rufogaster*, Gray.

*Sciurus castaneiventris*, Gray,  
 "Tupai Jinjang," "Ummu," or "Jau"  
 of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. Java, Sumatra, Assam, China, (Canton).

The ground colour of the Malayan individuals differs but slightly, according to the more red or yellow rust colour of the bands of the hairs. The anterior part of the tail above is of the same colour as the back, the rest is either uniformly black, reddish, or with transverse bands, or has the tuft of that colour. The colour of the ears is brownish in some, but generally of the leaden grey, grizzled colour of the head, cheeks, chin and outside of the limbs. The feet are black or slightly grizzled.

The largest individuals of this numerous species measure from the apex of the nose to the root of the tail one foot; the tail one foot and half inch.

(1133ll.) *SCIURUS VITTATUS*, Raffles.

SYN.—Tupai, Raffles.

*Sciurus bivittatus*, Raffles, Des- } Apud  
 mar. } Hors-  
*Ecureuil Toupai*, F. Cuvier, } field.  
*Macroxus Toupai*, Lesson, apud Gay:  
 List.

*Sciurus flavimanus*, Is. Geoffroy, apud Schinz.

"Tupai" of the Malays of the Peninsula.

HAB.—*Singapore, Penang, Malayan Peninsula*. Sumatra, Borneo, Canton.

This is the most numerous species in the Straits of Malacca, the largest individuals measuring from the apex of the nose to the root of the tail eleven inches; the tail eleven inches.

(1133mm.) *SCIURUS NIGROVITTATUS*, Horsfield.

SYN.—*Sciurus griseiventer*, Is. Geoffroy, apud Schinz.

HAB.—*Malayan Peninsula*. Java, Sumatra, Borneo, Canton.

Not numerous; the largest individual observed, a female, measured from the apex of the nose to the root of the tail nine inches; the tail eight and a half inches.

(1133nn.) *SCIURUS TENUIS*, Horsfield.

SYN.—*Sciurus modestus*, S. Muller?

HAB.—*Singapore, Malayan Peninsula*. Java, Sumatra, Borneo, Canton.

Of two individuals observed, the larger, a male measured from the apex of the nose to the root of the tail six inches; the tail seven inches.

(1133oo.) *SCIURUS LATICAUDATUS*, Diard, Var.

SYN.—*Sciurus laticaudatus*, Diard, apud S. Muller?\*

\* In the *List of Mammalia in the British Museum* occurs a genus: *Rhinosciurus*, Gray, and a species *R. tupaioides*, Gray, Syn. *Sciurus laticaudatus*, Müller?? Generic or specific characters being neither given nor referred to, it is impossible in India to decide whether the specimen in the British Museum thus labelled, is identical with the animal here characterised.

HAB.—*Malayan Peninsula*.

The present squirrel differs from the diagnosis of *Sciurus laticaudatus* from the west coast of Borneo, (communicated in *Natuur en Geneeskundig Archief*, &c., II, Jaarg. 1 Aflev. p. 87,) in having neither the first nor the fifth molar of the upper jaw very large. Both are of nearly equal size, and much smaller than the rest. The following is a description of the Malayan animal.

The shape of the head is depressed, elongated, conical, gradually attenuated towards the laterally compressed nose. The whole outline, the slender form, and general colours, render the animal strikingly similar to *Tupaia ferruginea*. The eyes are large, brilliant, dark; the ears large,



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oval, with smooth short hairs; the mouth is small, the upper incisors are very minute, the lower slender, flattened, and almost straight; the black mustachios, whiskers, superciliary and angular bristles, and the few white ones of the forearm, are all shorter than the head; the muzzle hairy, leaving the margins of the small, and at the apex laterally pierced nostrils, naked. The limbs and feet slender; the nailless tubercle of the thumb rudimentary, barely perceptible in the living animal. The claws are small, sharp, compressed, whitish.

The colour of the head, back, outside of the limbs and feet, is a rich rusty-red, mixed with shining black, particularly on the occiput, the back and the feet, less on the sides, where the ferruginous prevails; the throat, chest, abdomen and inner side of the limbs, whitish; in some individuals pale-yellowish. The fur is soft and delicate. The separate hairs are leaden-grey at the base, shining black, or with a broad subterminal ferruginous band. The tail is shorter than the body, distichous, broadest in the middle, attenuated at the root, terminating in a thin tuft. It may be compared to a feather, black on each side of the quill, successively ferruginous, again black, margined with buff. Such is the succession of the bands on the separate hairs. This organ is less full and ornamental than in the generality of squirrels. The species is apparently not numerous; the largest out of five examined, a female, was of the following dimensions:—

Length from the apex of the nose to the root of the tail,.....	10 $\frac{5}{8}$ inch.
„ of the tail,.....	6 $\frac{3}{8}$ „
„ of the head,.....	2 $\frac{3}{8}$ „
„ from the apex of the nose to the anterior angle of the eye,...	1 $\frac{2}{8}$ „
„ from the posterior angle of the eye to the ear,.....	0 $\frac{5}{8}$ „
Breadth above the apex of the nose,...	0 $\frac{1}{8}$ „
„ between the anterior angles of the eyes,.....	0 $\frac{7}{8}$ „
„ between the ears,.....	0 $\frac{6}{8}$ „
Diameter of the head at vertex,.....	1 „

Its habits in confinement presented nothing remarkable.

GEN.—PTEROMYS, Cuvier.

(1133pp.) PTEROMYS NITIDUS, Geoffroy.

SYN.—Sciurus petaurista, Lin, apud Cuvier?

Sciurus petaurista, Chin Krawa, Raffles?

Pteromys albiventer, Gray Illustr.

“Tupai Terbang” or “Kubin” of the Malays of the Peninsula.

HAB.—Singapore, Pinang, Malayan Peninsula, Java, Sumatra, Borneo.

The part of the head anterior to the ears, the cheeks, the chest, and the abdomen, are white in some individuals of either sex, one of which is figured in Hardwicke's *Illustrations of Indian Zoology*, under the denomination of *Pteromys albiventer*, Gray.

The black, or dark-brown eyelids, nose, chin, feet and tip of the tail, appear to be constant characters. The shade, and intensity of the red colour is liable to considerable variations. [In an individual from Malacca, the back was very dark Indian-red, with a few dashes of pure white. The identity of the species is, however, doubtful.] In the very young, there is a short black stripe behind the ears; and the posterior part of the back and anterior half of the tail are shining black, from each separate hair having the apex of that colour. Traces of these characters occur in some adult individuals. This species is very numerous in the Malayan countries. It is not strictly nocturnal, for it is frequently seen abroad during the day. It is particularly fond of the Durian, the fruit of *Durio Zibethinus*, Linne. The flying squirrel has this partiality, in common with various other animals, as monkeys, Pteropi and Paradoxuri; nay, the Malays assert, that they have to watch this, their favourite fruit, against tigers.

In a female, measuring from the extremity of the nose to the root of the tail, one foot six and half inches; the tail one foot nine inches: the intestinal canal was of the following dimensions:—

Small Intestines, ..... 7 feet 4 $\frac{1}{2}$  inches.

Large, ..... 5 „ 2 „

Cæcum, ..... 2 „ 4 „

(1133qq.) SCIUROPTERUS, Fred, Cuvier.

SCIUROPTERUS HORSFIELDII, Waterhouse.

SYN.—Pteromys aurantiacus, Wagner, apud Gray; List.

HAB.—Malayan Peninsula, Java? Sumatra?

A single skin, brought from Keddah, measured from the apex of the nose to the root of the tail eight and three-eighth inches; the tail eleven inches.

(1133rr.) SCIUROPTERUS GENIBARBIS.

SYN.—Pteromys genibarbis, Horsfield.

“Kechubu” Horsfeld.

HAB.—Malayan Peninsula, Java.

Of two, the larger, a male measured from the apex of the nose to the root of the tail seven and half inches; the tail seven inches.

MURIDÆ.

GEN.—MUS, Linne.

(1133ss.) MUS BANDICOTA, Bechstein.

SYN.—Mus giganteus, Hardwicke, }  
Mus malabaricus, Shaw, } Apud  
Mus perchal, Shaw, } Gray:  
Mus Ieria, Buchan, Ham, M. S. } List.  
Mus nemorivagus, Hodgson, }  
Tikus besar of the Malays of the Peninsula.

HAB.—Pinang, Malayan Peninsula. Southern Mahratta Country, Bengal, Nipal.

(1133tt) MUS DECUMANUS, Pallas.

SYN.—Mus Javanus, Pallas, apud Schinz.

Mus norvegicus, Brisson, apud Gray: List.

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"Tikus" of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*, Pinang, Cosmopolita.

(1133uu.) *MUS SETIFER*, Horsfield.

SYN.—"Tikus virok," Horsfield.

*Mus giganteus*, Temminck, apud Gray.

HAB.—*Pinang*. Java, Sumatra, Borneo, Van Diemen's Land.

The larger of two individuals, captured in gardens, measured head and body, ten and one-eighth inches; the tail seven and four-eighth inches.

(1133vv.) *MUS RUFESCENS*, Gray.

SYN.—*Mus flavescens*, Elliot, } Apud Gray :  
*Mus rufus*, Elliot, } List.

HAB.—*Pinang*. Dharwar, Madras, Bengal, Arracan.

In the young, the brown bristles are fewer, and leave the head-coloured under-fur more apparent. The colour of the abdomen is paler yellowish-grey than in the adult. The species is numerous at Pinang in out-houses. In the largest observed, the head and body measured seven and six-eighth inches; the tail (mutilated,) four and two-eighth inches.

(1133ww.) *MUS MUSCULUS*, Linne?

SYN.—"Tikus ruma" of the Malays.

HAB.—*Pinang*.

In colours, this slightly differs from the European mouse, the upper parts being a mixture of shining grey and tawny. The separate hairs are leaden-grey at the base, then tawny with black apex; some are longer and uniformly dark-brown. Beneath pale-ash. The ears are large, more than one-half of the length of the head, with very short hairs, rounded, blackish. Toes, palms and soles, whitish. Tail slender, dark-grey, with very short oppressed brown hairs. Length of the head and body, two and five-eighth inches: tail two and four-eighth inches.

GEN.—*RHIZOMYS*, Gray.

(1133xx.) *RHIZOMYS SUMATRENSIS*, Gray.

SYN.—*Mus sumatrensis* Raffles.

"Dekan," Raffles.

*Hypudeus de Sumatra*, Temm. } Apud

*Nyctoeptes Dekan*, Temm. } Gray:

*Spalax javanus*, Cuvier, } List.

*Rhizomys chinensis*, Gray, apud Schinz

*Rhizomys cinereus*, McClelland.\*

*Rizomys Decan*, Schinz.

"Tikus bulow" of the Malays of the Peninsula.

\* The description of this supposed species *Calcutta Journal of Nat. Hist.* Vol II p 456, Pl. XIV.) states, "There are four toes to each fore-foot, and five to each hind-foot." The draughtsman of Pl XIV, "*Rhizomys cinereus*," has, at all events, observed, that all the feet are five-toed, however incorrectly he has represented the animal. Another error occurs in the description, viz.: "Sir Stamford Raffles describes a species of Bamboo Rat found in Sumatra by Colonel Far-

quhar," &c., Sir S. Raffles' words are these "MUS SUMATRENSIS. A drawing and specimen of an animal, which appears related to the *Mus Pilorides*, was forwarded from Malacca" (not Sumatra, as erroneously asserted) "by Major Farquhar, to the Asiatic Society at the same time with the Binturong. I am informed by him that it is not uncommon at Malacca, and is perhaps to be found in most parts of the Malay Peninsula", &c. *Transact. Linn. Society*, Vol. XIII.

HAB.—*Malayan Peninsula*. China, Moulmein, Assam.

Although the animal was first described in Sir Stamford Raffles' catalogue of collections, made in Sumatra, the author distinctly states that it was forwarded from Malacca by Major Farquhar; nor does it appear to inhabit Sumatra, although the specific name would lead one to suppose that such is the case. The colour of the adult is liable to individual variations, from grey of different shades to isabella or silvery-buff. The separate hairs are mostly of the colour prevailing in the individual, mixed with single dark-brown hairs with whitish apex, particularly on the vertex, continuing along the centre part of the back. On the nose, anterior part of the head, and on the cheeks, the hairs are of a pale rust colour. On the vertex some white hairs form either a spot or a short line of that colour. The scanty hairs of the abdomen are all of a pale-greyish or isabella colour. The mustachios, whiskers, superciliar and gular bristles, are either of a pale-brown or buff colour. The young are above of a dark-grey, with a brown streak on the vertex and back; beneath pale-grey. The forehead, nose, temples, and cheeks, are ferruginous. The adult, like some squirrels and rats, is subject to enlargement of the scrotum. In confinement, it is very savage, scarcely tameable. The length of the tail varies from about one-third to little more than one-fourth of the length of the body. It is blackish, or brownish; the apex whitish. The largest male examined, measured from the apex of the nose to the root of the tail, one foot seven and a half inches; the tail five and a half inches. The female, in size and colours equalling the male, has ten mammæ, viz. two axillary, and three inguinal pairs.

GEN.—*HYSTRIX*, Cuvier.

(1133yy.) *HYSTRIX LONGICAUDA*, Marsden.

SYN.—*Acanthion Javanicum*, Fred Cuvier?

*Hystrix brevispinosus*, Schinz.\*

"Babi Landak" of the Malays of the Peninsula.

\* In "*Nachtrage Zum 2ten, Bande*," this species is supposed to be identical with, and substituted for *Atherura fasciculata*, although a very correct description is given of both.

HAB.—*Malayan Peninsula*. Java, Sumatra, Borneo.



Sir Stamford Raffles has pointed out the inaccuracy of Marsden's figure, representing the forefeet with five toes, instead of with four, and a rudimentary thumb with a flat nail. The figure also has a few mane-like long bristles on the head, whereas the mustachios are situated on the side of the nose, the whiskers below the ear, and one or two bristles above the eye. In colours, this species resembles *Hystrix leucurus*, Sykes, from which it differs in the absence of the long mane-like bristles of the head and neck. Although single, scattered, thin, flexible spines, upwards of twelve inches in length, occur on the posterior part of the back, the majority of inflexible spines are much shorter than in *Hystrix leucurus* or *H. cristatus*, and are either pure white, or with a blackish band in the medial portion. The short, blackish, slightly iridescent spines of the neck, anterior part of the back, the limbs, and abdomen, are generally grooved on the upper surface. The short white pedunculated tubes of the posterior part of the tail are at first closed, terminating in a short spine, which latter wears off, leaving the tubes open. The pubes are disposed in a wreath of stiff bristles, frequently of a deep rust colour. The epidermis of this species, as well as of *Atherura* is remarkably thin and liable to be torn. Beneath the skin appears a fatty tissue, upwards of an inch in thickness. The anterior molars are slightly larger than the rest. Viewed from above, *in situ*, the crown of the anterior lower molar of either side presents the form of two letters S., facing each other (SS). In a foetus,—of which the head measures two and one-eighth inches, the body four and three-eighth inches, the tail one inch in length,—the whole of the body, and the anterior half of the tail have numerous short hairs, disposed on separate transverse lines of six to eight distant black hairs, becoming longer on the posterior part of the back and sides. The posterior part of the tail has longer and closer hairs. In a female, measuring from the apex of the nose to the root of the tail two feet five inches, the tail four inches, the intestinal canal was of the following dimensions :

Small Intestines,.....	21 feet	6 inches.
Large do.....	5 „	10 „
Cæcum,.....	1 „	7 „

The stomach is of a heart-shaped outline, with thin membranes externally smooth, internally with a few longitudinal rugæ near the narrow fundus.

The species is numerous, and, as it is considered a delicacy by the Chinese population, is frequently brought to market.

GEN.—*ATHERURA*, Cuvier.

(1133zz.) *ATHERURA FASCICULATA*, Cuvier,  
SYN.—*Hystrix fasciculata*, Lin., apud Cuvier.\*

\* No species of that name occurs in *Systema Naturæ*, Ed. XIII Gmelin, 1788, but *Hystrix macroura* is described “cauda longitudine corporis” (22) “anice fasciculo pilorum” &c.

*Hystrix orientalis*, Brisson, apud Gmelin.  
*Hystrix macroura*, Linne  
Porc-épic de Malacca, Buffon.  
*Hystrix fasciculata*, Shaw, apud Raffles.  
*Mus fasciculatus*, Desmarest.  
*Hystrix fasciculata*, Linne, apud Gray :  
Illustr.†

† In the figure, the anterior foot has one toe too many, the animal having four toes and a rudimentary flat-nailed thumb. Nor is the back of the hind foot naked, unless indeed become so by accident.

*Acanthion Javanicum*, F. Cuv.  
*Atherurus fasciculatus*, Schinz.  
*Atherurus macrourus*, Schinz.  
“Landak” of the Malays of the Peninsula.

HAB.—*Pinang, Malayan Peninsula, Java, Sumatra, Borneo.*

The nose, lips, forehead, and back of the feet, are covered with greyish-brown hairs. The body and limbs at the root of the spine, are covered with dense soft silky hairs, grey on the upper parts, and silvery on the abdomen. Single longer flexible spines, white with a dark central band, are scattered over the back. The anterior part of the tail is like the back, covered with flat-grooved spines, white at the root, then slightly iridescent brown, and frequently with white apex. The centre part of the tail is scaly, with very short spines between the scales. The posterior part is white; with white or silvery, flexible, and in length gradually increasing, spines, which Buffon has aptly compared to narrow slips of irregularly cut parchment. The pubes are of a deep rust colour.

This species is very numerous in the Malayan valleys and hills. In fretful habits, and in its food, it resembles the preceding porcupine, like which, it is carried to the market at Pinang and Malacca, where as many as twenty to thirty may frequently be seen. In a male, measuring from the apex of the nose to the root of the tail one foot ten inches, the tail ten inches; the intestinal canal was of the following dimensions :

Small Intestines.....	19 feet	4½ inches.
Large.....	5 „	3 „
Cæcum.....	1 „	3 „

The stomach is of a general outline, resembling that of *H. longicauda*, but it differs in having an external deep vertical sulcus, dividing the stomach into a pyloric and a cardiac portion, which latter presents 6 to 7 deep oblique sulci. The membranes of the stomach are thick and muscular. Internally the cardiac portion is transversally divided by six or seven ridges, corresponding to the external sulci, intersected by numerous concentric rugæ.

The pyloric portion, separated from the cardiac by the rugæ produced by the external vertical sulcus, is much smoother, and has but a few

# MAMMALIA OF MALAYAN PENINSULA AND ISLANDS.

## EDENTATA.

GEN.—MANIS, *Linne.*

(1133aa.) MANIS JAVANICA, Desmarest.

SYN.—*Manis pentadactyla*, Lin, apud Raffles.

*Manis aspera*, Sundeval.

*M. quipedactyla*, Raffles, apud Gray :  
List.

“Penjoling” or “Tangiling” of the Malays  
of the Peninsula.

HAB.—*Penang Malayan Peninsula*. Java,  
Sumatra, Borneo.

The series of dorsal scales vary in individuals  
from 16 to 19. The number of central dorsal  
vary from 20 to 22; the central and the marginal  
caudal from 25 to 29: in the young all the  
scales are finely lined and the rounded apex  
only is smooth. With age the lines become ob-  
literated on the exposed surface of the scales,  
between which appear a few long whitish bristles.  
The very young animal corresponds to the de-  
scription of *Manis aspera*, Sundeval. The eyelids,  
the margins of the ears, and the scaleless parts,  
except the palms and soles, are scantily provided  
with short whitish hairs. The two pectoral  
mammaræ are situated at a short distance from the  
axilla. Its habits present nothing different from  
those of *Manis crassicaudata* (*M. pentadactyla*,  
Linne), of which an interesting account is com-  
municated by Lieut. R. S. Tickell in *Journal*  
*Asiatic Society*, Vol. XI. 1842. p 231.

The present species, although numerous in  
rocky situations, is not often captured, as it is  
seldom abroad till after sunset. The largest male  
measured from the apex of the nose to the root  
of the tail one foot nine and a half inches; the  
tail one foot eight inches. In a younger male,  
the entire length of which was one foot eleven  
inches; the intestinal canal was of the following  
dimensions:

Small Intestines..... 8 feet. 4 Inches.

Large ditto,..... 0 „ 6 „

Cæcum is rudimentary, indicated by a slight,  
yet distinct widening of the intestines. The sto-  
mach is capacious, the pyloric region thickened  
and gizzard like. On the external surface, where  
the greater curvature begins to ascend, is situated  
a small (one inch in length, one and three-eighth  
in breadth) triangular, externally gyrated, glan-  
dular body, firmly attached to the stomach, but  
not communicating with the cavity. Its external  
appearance might be compared to that of a crest  
of ostrich feathers. The narrowed apex, towards  
the pylorus, is provided with a small, thick,  
rounded and wrinkled opening, surrounded by  
concentric fibres, leading by a common, short,  
cylindrical duct to the broader cavity, which lat-  
ter is divided by two longitudinal parietes into  
three separate portions. If a tube is introduced  
into the common duct, the air injected will simul-  
taneously fill all three portions of the cavity,  
but if the tube is inserted into any one of the  
three separate portions, the air will fill that par-

ticular portion, leaving the two others collapsed.  
The interior surface of this organ secretes a whit-  
ish mucus. Adjoining the common opening,  
from ten to eleven small rounded glands com-  
mence, arranged on a line towards the pylorus.  
Each gland has, in its centre, a minute wrinkled  
opening, leading into a small cavity secreting  
mucus.

The stomach was extended by the remains  
(heads and legs,) of a prodigious quantity of large  
black ants, inhabiting the hills. The contents of  
the stomach were involved in mucus, deeply tinc-  
tured with bile, and among them appeared five  
small rounded fragments of granite. Another  
individual expired after 10 days' confinement,  
during which period it took no food, although it  
was repeatedly placed among swarms of the black  
and red ants, so excessively numerous in the val-  
ley of Pinang. Water it always took when offer-  
ed, lapping it up with the tongue in the same  
manner that serpents drink.

Costæ veræ 8 pairs; spuræ 7 pairs = 15  
pairs. The ensiform process of the os sternum,  
is greatly elongated, terminating in a broad,  
rounded, thin cartilaginous plate.

## PACHYDERMATA.

### PROBOSCOIDEA.

GEN.—ELEPHAS, *Linne.*

(1133bb.) ELEPHAS INDICUS Linne.

SYN.—“Gajah” of the Malays.

HAB.—*Malayan Peninsula*. India, Burma,  
Siam, Ceylon, Sumatra, Borneo.

Elephants are very numerous on the Malayan  
Peninsula. They may be procured at the follow-  
ing rates:—

“For an elephant	4 ft. 6 ins. high	120 Dollars.
do.	5 „ 3 „.....	200 „
do.	6 „ 0 „.....	220 „
do.	6 „ 9 „.....	400 „
do.	7 „ 6 „.....	420 „

Those exceeding this height are paid for at an  
advance on the last mentioned rate of 20 dollars  
for one foot six inches. If above eight feet and  
three inches, then an addition of 40 dollars for  
each one foot six inches is charged. Elephants  
ten feet six inches in height are taken by the Sia-  
mese to the Capital, and it is not permitted  
to sell them. The Keddah chiefs used formerly  
to breed elephants, a speculation rarely, if ever,  
attempted elsewhere. Coromandel Native Tra-  
ders were, until late years, constantly in the  
habit of loading vessels with elephants for that  
Coast.” (Extract from Lieut. Colonel James  
Low's “*Dissertation*” &c.)

## ORDINARIA.

GEN.—SUS, *Linne.*

(1133cc.) SUS INDICUS, Schinz.

SYN.—*Sus Scrofa*, Linne, apud Elliot.

*Sus indicus*, } Apud Gray :  
*Sus Scropha*, Hodgson. } List.  
*Sus vittatus*, Schlegel.  
*Sus cristatus*, Wagner, apud Schinz.



# MAMMALIA OF MALAYAN PENINSULA AND ISLANDS.

"Babi utan" of the Malays of the Peninsula.

HAB.—*Malayan Peninsula, Pinang, Singapore, Luncavy Islands.* Bengal, Nipal, Southern Mahratta Country.

The difference between the Indian and the German wild hog (*Sus Scrofa ferus*, Lin.) have been pointed out by W. Elliot, Esq. (*Madras Journal*, Vol. X. 1839, p. 219.) The colour of the adult is brownish-black, scantily covered with black hairs, of which few retain the infantile yellowish subterminal band. Besides the black recumbent mane of the occiput and back, the whiskers and bristles above and below the eye, there is a bundle of long black bristles on the throat. The hairs of the throat and chest are reversed. The tail is scantily covered with short hairs, the apex compressed, with long lateral bristles, like those of the elephant, arranged like the wings of an arrow. The young is more hairy, with the plurality of hairs tawny or fulvous, some with black root and apex, which, as they are more or less mixed with black hairs, produce on the sides of the body saturated fulvous stripes. The hairs of the throat, chest, abdomen, and elbows, (in the two latter places very long,) are black at the basal, and white at the apical half. Wild hogs are exceedingly numerous on the Peninsula, and most of the Malayan Islands. The largest boar examined measured from the apex of the nose to the root of the tail, five feet; the tail one foot. The stomach of a young boar, examined shortly after it had been speared, was extended with food, principally consisting of the remains of a very large coleopterous larva, some small seeds of different kinds, leaves, grass and roots.

(1133dd.) *SUS SCROFA*, VAR. *SINENSIS*, Linne.  
SYN.—"Babi" of the Malays.

Introduced by the Chinese settlers.

GEN.—*RHINOCEROS*, Linne.

(1133ee.) *RHINOCEROS UNICORNIS*, Linne.  
SYN.—*Rhinoceros indicus*, Cuvier.

*Rhinoceros asiaticus*, Blumenbach.

*Rhinoceros inermis*, Lesson.

"Badak" of the Malays of the Peninsula.

HAB.—*Malayan Peninsula.* Bengal, Assam, Nipal.

(1133ff.) *RHINOCEROS SONDAICUS*, Cuvier.  
SYN.—*Rhinoceros sondaicus*, Cuvier, } Apud  
"Warak," Badak," } Horsfield.

*Rhinoceros Javanensis*, F. Cuvier, apud Schinz.

HAB.—*Malayan Peninsula.* Java.

This, as well as the former species, appears to be numerous on the Malayan Peninsula.

A two-horned *Rhinoceros* is stated by the Malays to inhabit, but rarely to leave, the densest jungle. The Museum of the Asiatic Society possesses a skull, and also a head with the skin on, of *Rhinoceros Sumatranus*, Raffles, from the Tenasserim Provinces, in which locality the

existence of the species has been recorded by Dr. Helfer and Mr. Blyth. This fact would seem to corroborate the statement of the Malays, and the habitat of *Rhinoceros Sumatranus* may reasonably be expected to be hereafter found to extend over the neighbouring Malayan Peninsula. As such, it has indeed been enumerated by Capt. Begbie, the author of "*Malayan Peninsula*," &c, Madras, 1834. In Lieut. Col. Low's *History of Tenasserim* (Journal Royal Asiatic Society, Vol. 3. 1836,) is figured the head of a young *Rhinoceros*, which, from the considerable protuberance between the eyes, appears to represent a two-horned, probably the present, species.

GEN.—*TAPIRUS*, Linne.

(1133gg.) *TAPIRUS MALAYANUS*, Raffles.

SYN.—*Tapirus malayanus*, apud Horsfield.

*Tapirus indicus*, Fred. Cuvier.

*Tapirus sumatranus*, Gray.

Me des Chinois, Remusat, young? apud Gray: List.

*Tapirus bicolor*, Wagner, apud Schinz.

"Badak" "Kuda Ayer," "Tennu" of the Malays of the Peninsula.

HAB.—*Malayan Peninsula.* Sumatra, Borneo.

The body of a new born male, found in Province Wellesley in August 1844, was shortly after its death carried over to Pinang. As described by Colonel Farquhar, it was of a beautiful black velvet colour, with purple reflections, with numerous small, and other larger, irregular spots on the body, arranged in longitudinal stripes, above of a rich gamboge, beneath and on the inner side of the extremities, paler yellow. The underlip was white. The shrivelled remains of the black funiculus umbilicalis were upwards of four inches in length. The fur very short, dense, and velvety. The separate hairs, of either of the two prevailing colours, slightly curly.

## DIMENSIONS.

Length from the apex of the			
nose to the root of the tail,	1 foot	10 inches.	
Length of the head.....	0	7	"
" of the tail,.....	0	1 $\frac{3}{8}$	"
" of the ear.....	0	1 $\frac{5}{8}$	"
Diameter of the head from			
vertex.....	0	5	"
Height of the shoulder,.....	0	8 $\frac{2}{8}$	"
Height of the haunch,.....	0	9	"

The animal, from which a sketch was taken on its arrival at Pinang, was the property of the Rev. R. Panting, A. M. The skin, imperfectly preserved, has lately been deposited in the Museum of the Asiatic Society.

On the 16th of May 1845, I obtained a living young female *Tapir*, captured in Keddah a few days previously. Though still in its infantile garb, it was older than the preceding. The ground colour was a brownish-black, like worn-out velvet; the spots, stripes, and the posterior part of the abdomen were of a dirty-white. The separate hairs were longer and curly; the hairy

# MAMMALIA OF MALAYAN PENINSULA AND ISLANDS.

ears retained numerous white spots on the margins and external surface. The lips were blackish, with numerous short distant bristles, which also appeared round the nostrils, on the ridge of the nose, above and below the eyes, on the cheeks and on the throat. Two black mammae were situated between the hind legs, three and a half inches behind the large naked cicatrix of funiculus umbilicalis.

## DIMENSIONS.

Length from the apex of the nose to the root of the tail,	3 foot 4 $\frac{3}{8}$ inches.
Length of the head,	1 " 0 "
Length of the tail,	0 " 1 $\frac{2}{8}$ "
Length of the ear,	0 " 5 $\frac{4}{8}$ "
Diameter of the head from vertex,	5 " 5 $\frac{4}{8}$ "
Height of the shoulder,	1 " 4 "
" haunch,	1 " 6 "
Greatest circumference round the body,	2 " 6 "
Circumference at the root of the ear,	0 " 6 "

## DENTITION.

6	0—0	3-3
Incis. —	Canin. —	Molar. —
6	1—1	3-3

From the first, although fresh from its native wilds, this young Tapir shewed a remarkably gentle disposition. The day time it spent in sleeping in a dark recess of the portico of my house, though it would rouse itself if noticed. Towards sunset it became lively, would bathe, feed, saunter abroad, and with its lengthened nose examine objects in the way. Within a few days after its arrival, it commenced to exhibit a marked partiality to the society of man, not indeed to its keeper in particular, whom it scarcely had discrimination enough to distinguish, but to any body who happened to notice or caress it. Towards sunset, it would follow a servant on the green in front of the house, and punctually imitate his movements, whether standing, walking, or running. If the man suddenly hid himself, the Tapir would hasten to the spot where it had lost sight of its leader, look about in all directions, and, if unsuccessful in discovering him, express its disappointment by a peculiar loud whistling. On the re-appearance of the man, it expressed its pleasure by rubbing its side against his legs, running between them, occasionally giving out a short singular sound, resembling that produced when the larger wood-pickers tap the trees, but more sonorous. When of an evening it heard the voices of people in the verandah above the portico, it exhibited strong marks of impatience, till let loose, when of its own accord it would, awkwardly enough, ascend a flight of stairs leading to the verandah. It would then quietly lie down at their feet, and by stretching its limbs and shaking its head, express the satisfaction it

derived from being caressed; and it was only by compulsion that it could be made to leave the company. Its food consisted of plantains, pine-apples, mangustins, jambu, leaves of *Ficus pipul*, sugar-cane, and boiled rice, of which latter it was particularly fond, if mixed with a little salt. Its drink was water, and also milk and cocoanut oil, which latter taste the Tapir possesses in common with the Orang-utan. It delighted in bathing, and was otherwise cleanly. When roaming about the garden, (its walk was like that of the elephant,) it would select a spot with soft earth, and like a cat form with its hind legs a small excavation, and again cover it. The whole body has a peculiar, and by no means offensive exhalation, somewhat resembling that noted of *Arctictis Binturong*. Indeed, this is so tenacious, that although the skin of the individual above described has been preserved more than a twelvemonth, and kept in a strongly camphorated case, the odour is still perceptible.

On the 27th of June 1845, the subject of the preceding notice expired after two days' illness, from inflammation of the lungs, brought on by the strong southerly winds, prevailing throughout the Straits of Malacca during the season, which in man produces a slight influenza, in animals frequently terminating fatally. The few adult Tapirs, which occasionally have been kept in confinement by residents at Malacca, have acquired the character of being hardy animals. During the short period that the present lived in my possession, no perceptible change appeared in its growth, but a striking alteration took place in its colours. Nearly all the white spots on the head, nape of the neck, and back of the ears, gradually disappeared, and the upper part only of the margin of the ears remained white, which colour it retains in the adult animal. On the posterior part of the back and sides, the black and white stripes were in a state of progressing obliteration, their hairs had faded to a brownish colour, and were about being replaced by a shorter and less dense fur of the fresh white hairs, which were to form the characteristic permanent white mark, already appearing in outline, when death terminated the unfinished process of nature.

Vertebrae; cervical seven, of which the atlas and epistrophæus are the largest; dorsal twenty; lumbar four; sacral seven; caudal three.

Sternum. The anterior extremity cartilaginous, sharply keeled, arched, continued over manubrium, composed of two rounded angularly-joined pieces, as far as the second pair of ribs; corpus composed of five pieces, of which the two posterior, in a pair, are connected by cartilage.

Costæ verae, eight pairs; spuriae, twelve pairs=twenty pairs; the last spurious rib is rudimentary, and absent on the left side.

Femur, five and two-eighth inches long; the large bony sub-trochanteric process, describ-



## MAMMALIA OF MALAYAN PENINSULA AND ISLANDS.

ed by Sir Everard Home, is developed, though partly cartilaginous, measuring one inch in length at the base.

Liver of moderate size, each lobe divided into two portions of nearly equal size.

Gall-bladder, none.

Spleen; tongued-shaped, flattened, with cutting margins, seven and a half inches in length, one and six-eighth in breadth.

Pancreas; in a state not to admit of accurate examination.

Kidneys; three and six-eight inches in length; one and six-eighth in breadth.

Renes succenturiati, none. ●

Urinary bladder; very large.

Stomach; capacious. Its dimensions in the state in which it appeared, distended with food, were—

Length along the smaller curvature, 0 ft. 5 $\frac{3}{8}$  ins.

Length along the greater, 1 „ 9 $\frac{1}{8}$  „

Circumference from cardia round

fundus,..... 1 „ 0 „

Circumference round pylorus,..... 0 „ 3 $\frac{1}{2}$  „

The internal surface smooth, villous.

Where the duodenum joins the pylorus, it is considerably widened.

Length of the intestinal canal:

Small Intestines,..... 27 feet 7 inches.

Large,..... 6 „ 4 „

Cæcum, ..... 0 „ 6 „

Average circumference of small, 0 „ 2 $\frac{3}{8}$  „

Do. do. large, ... 0 „ 3 $\frac{1}{2}$  „

Cæcum sacculated, with a longitudinal band on either side. - Distended with fæces as it appeared, the greatest circumference close to the fundus was one foot one and a half inch.

In the adult Tapir dissected by Sir E. Home, and which was according to Mr. Yarrel eight feet in length, the relative proportion between the length of the intestinal canal and that of the body, was as eleven to one. In the present young female, the relative length of the intestinal canal is proportionally less than in the adult, being less than as ten to one.

### SOLIDUNGULA.

GEN.—*EQUUS* Linne.

(1133hh.) *EQUUS CABALLUS*, Linne.

The horse, “Kuda” of the Malays appears not to be indigenous in the Peninsula. The few ponies, which the wealthier use for ordinary purposes, are imported either from Siam, Burma, or Sumatra. The Malays either travel by water, or prefer the elephant as a locomotive more dignified than the horse.

### RUMINANTIA.

GEN.—*MOSCHUS*, Linne

*TRAGULUS*, Brisson.

(1133R.) *TRAGULUS KANCHIL*, Gray; List.

SYN.—Chevrotain adult, } Buffon, apud Gray.  
Chevrotain de Java, }  
Javan Musk, Shaw.

*Moschus Palandok*, Marsden.

*Moschus Kanchil*, Raffles.

*Pelandok*, Raffles.

*Moschus fulviventer*, Gray.

“Kanchil” or “Pelandok” of the Malays of the Peninsula.

HAB.—*Singapore, Pinang, Lancary Islands, Malayan Peninsula.* Sumatra, Java.

In some individuals the back is nearly black.

The colour and distribution of the marks of the chest and abdomen are also liable to individual variations, one of which gave rise to the supposed species, *Moschus fulviventer*. The animal is by the Malays indiscriminately denominated “Kanchil”, and “Pelandok;” the latter denomination is sometimes *par excellence* applied to the young, and this circumstance in all probability gave rise to the supposed species *Moschus Pelandok*. The species is astonishingly numerous. In Prince of Wales’ Island, any number may be procured within a short notice, at the rate of one Spanish dollar per dozen. Knowing the partiality of these deer to the leaves of the sweet potato plant (*Convolvulus batatas*), the Malays either use traps, baited with this vegetable, or lie in ambush in moonlight nights in fields where it is cultivated, and disable the intruders by throwing sticks at their legs. In confinement, in its native climate, the animal becomes rather delicate, though it occasionally survives, and even breeds. The female has four mammæ, and one or two young at the time. The new-born measures eight and six-eight inches in length, of which the head is three inches, the tail one inch. The skin of the upper parts is of a pale blackish colour, scantily covered with short, fine, brown hairs. The abdomen and inner side of the limbs are pale yellow; the throat and chest have the dark marks of the adult, but paler. The largest adults measure from the apex of the nose to the root of the tail, one foot six and a half inches; the tail three inches in length.

(1133jj.) *TRAGULUS JAVANICUS*, Pallas.

SYN.—*Moschus Javanicus*, Gmelin.

*Moschus Javanicus*, Pallas, apud Raffles.  
Napu, Raffles.

*Moschus indicus*, Gmelin, } Apud Gray.  
*Cervus Javanicus*, Osbek. }

*Moschus Napu*, Fred. Cuvier.

“Napu” of the Malays of the Peninsula.

HAB.—*Malayan Peninsula.* Sumatra, Java, Borneo.

On the Malayan Peninsula, the species appears to be far less numerous than the preceding. The canines of the female are very small. The four mammæ are situated at the posterior part of the abdomen, a little in front of the hind legs. The anterior pair are half an inch apart; the posterior two-eighths of an inch apart. The two pairs are half an inch distant from each other. In an adult female, measuring from the apex of the

# MAMMALIA OF MALAYAN PENINSULA AND ISLANDS.

nose to the root of the tail two feet, four and two-eighth inches; the tail five inches: the intestinal canal was of the following dimensions:

Small Intestines..... 13 feet 6 inches.  
Large ditto..... 7 „ 10 „  
Cæcum..... 0 „ 6 „

The gall-bladder is very large; immediately behind it is situated the right kidney.

GEN.—CERVUS, Linne

STYLOCEROS, Hamilton Smith

(1133kk.) STYLOCEROS MUNTJAK, H. Smith.

SYN.—Chevreuil des Indes, Allamand.

Cervus Muntjak, Zimmerman, apud Horsfield, Sykes and Elliot.

Cervus Muntjak, Boddaert,  
Cervus vaginalis, Boddaert,  
Cervus Muntjak, Schreber,  
Cervus Muntjak, Marsden,  
Cervus moschatus, Blainville,  
Cervus subcornutus, Blainville,  
Cervus Muntjak? Shreb, apud Raffles.

Apud. Horsfield.

Cervus Muntjak, Desmarest,  
Cervus moschus, Desmarest,  
Cervus aureus, Ham. Smith,  
Cervus Philippinus, Ham. Smith,  
Cervus albipes, Fred. Cuvier,  
Cervus Ratwa, Hodgson,  
Muntjacus vaginalis, Gray: List.  
Cervus Muntiac, Linne, apud Schinz.\*  
“Kidang” of the Malays of the Peninsula.

Apud Gray: List.

\* In “Nachtrage zum 2ten. Bande,” the author suggests that six distinct species are supposed to lie hid under the denomination of *Cervus Muntiac*, viz:

1. *Cervus styloceros*, Schinz, *Syn. C. Muntiac*, Lin. apud Ogilby. *Hab.* Himalayah.
2. *Cervus Ratwa*, Hodgson. *Hab.* Himalayah.
3. *Cervus albipes*, F. Cuvier. *Hab.* India.
4. *Cervus Muntjac*, Raffles and Horsfield. *Hab.* Java, Sumatra, Banka, Borneo.
5. *Cervus Reevesii*, Ogilby. *Hab.* China.
6. *Cervus antisiensis*, Pucheran. *Hab.* Andes.

HAB.—*Malayan Peninsula*. Java, Sumatra, Banka, Borneo, Tenasserim, Nipal, Assam, Bengal, South Mahratta Country, Dukhun.

In a young male, measuring from the apex of the nose to the root of the tail three feet and one inch, the tail seven inches; the intestinal canal was of the following dimensions:

Small Intestines..... 13 feet 10 inches.  
Large..... 22 „ 1 „  
Cæcum..... 0 „ 9 „

The right lobe of the liver lies in contact with the right kidney; the spleen with the left.

Gall-bladder; none.

AXIS, Hamilton Smith.

(1133ll.) AXIS MACULATUS, Hamilton Smith.

SYN.—Axis, Plinius.

Cervus nudipalpebra, Ogilby,

(black Var.)..... } Apud  
Axis major, Hodgson,..... } Gray: List.  
Axis minor, Hodgson,..... }

“Rusa Bunga” of the Malays of the Peninsula.

HAB.—*Malayan Peninsula, Pinang*. Sumatra, Bengal, Assam, Nipal, Southern Mahratta Country, Ceylon.

Sir Stamford Raffles thinks it probable that the Axis in Sumatra has been introduced from Bengal. It is numerous in Keddah, and at present in Pinang. But it did not inhabit Prince of Wales’ Island till one of the last Governors of the late Presidency took the trouble of importing from Bengal some pairs, which were kept in the park adjoining Government House, (Suffolk House.) When the Presidency of Prince of Wales’ Island was abolished, and with it all its paraphernalia, except the titles of as many of its officers as were necessary to the continuance of H. M. Court of Judicature, the deer of the quondam Governor’s park found their way into the jungle, where they have multiplied to a prodigious extent.

RUSA, Hamilton Smith.

(1133mm.) RUSA EQUINA, Hamilton Smith.

SYN.—Cervus equinus, Cuvier.

Cervus Rusa, Raffles.

Rusa etam or Kumbang, Raffles.

“Rusa” or Rusa etam” of the Malays of the Peninsula.

HAB.—*Malayan Peninsula, Pinang*. Sumatra, Borneo.

The Malayan individuals correspond with the description given by Sir S. Raffles of *Cervus Rusa*. The lips are whitish; the posterior part of the lower, sometimes dark-brown. Round the eyes and the lachrymal sinus, on the side of the forehead, root of the ears, and on the throat, the hairs are either uniformly pale ferruginous, or have a subterminal band of that colour, the effect of which is to impart a pale rusty tint to these parts. Normally, each horn has three antlers, of which the lower or anterior, commencing from the burr, is directed outwards till towards the apex which turns slightly inward. The second and outward turned antler commences at the root of the third, and is the shortest of the three. The third is directed inwards, and is the longest of the three. In the number, direction, and size of the antlers, numerous individual variations occur.

According to Mr. Blyth’s observations, *Cervus Hippelaphus* has, normally, the third antler much longer than the second; *Cervus Aristotelis* has much larger and more divergent horns, of which the second and third antlers are about equal. Considering the similarity of colours and size of *Cervus equinus*, *Hippelaphus*, and *Aristotelis*, Mr. Elliot is probably right in consider-



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described by Aristotle under the designation of *Hippelaphus*. (*Madras Journal*, 1839, p. 220.), and *Cervus Peronii*, Cuvier—*Cervus* du Timor—may probably be added as a fourth variety.

PANOLIA, Gray : List.

(1133nn.) PANOLIA ACUTICORNIS, Gray : List?  
SYN.—*Cervus frontalis*, McClelland?

*Cervus lyratus*, Schinz?

HAB.—*Malayan Peninsula*.

A single skull of a stag, killed in Keddah, has the horns so like those of the Munneepore animal, that the species might be taken to be identical, but that the Malays assert theirs to be maned, and of a dark colour, with white spots, like the Axis. This stag is further described as being extremely wary, and therefore seldom seen but on heights inaccessible to man. The skull is of an old male, with the teeth, canines in particular, much ground.

GEN.—ANTILOPE, Linne.

NEMORHEDUS, Hamilton Smith

(1133oo.) NEMORHEDUS SUMATRENSIS, Hamilton Smith.

SYN.—Kambing utan, Marsden.

Antilope Sumatrensis, Pennant, apud Raffles.

Cambtan, Fred Cuvier.

Antilope interseapularis, Lichtenstein, apud Schinz.

"Kambing utan" of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. Sumatra, Tenasserim.

It appears to be numerous on the Malayan Peninsula, but exceedingly difficult to obtain, as it frequents the steepest hilly localities, and is very shy and active.

GEN.—BOS, Linne.

(1133pp.) BOS GOUR, Trail.

SYN.—Bos Gaurus, Ham Smith.

Bison Gaurus, Ham. Smith.

Bos aculeatus, Wagler.

The Bison, Low : Hist. of Tenasserim.

Bos (Bibos) cavifrons, Hodgson, apud Elliot.

Bos frontalis, Lambert, apud Gray List. (??)

"Sapi utan" of the Malays of the Peninsula.

HAB.—*Malayan Peninsula*. Tenasserim, Hindostan, Assam, Nipal, Southern Mahratta country.

Numerous in the Malayan Peninsula.

(1133qq.) BOS TAURUS, VAR. INDICUS, Linne.

SYN.—"Sapi" (S. Jantan, Bull; S. betina, Cow of the Malays of the Peninsula.

Although this kind of cattle is plentifully bred in some of the Malayan countries, it is not in general use, and is less numerous than the buf-

BUBALUS, Hamilton Smith.

(1133rr.) BUBALUS ARNEE, Hamilton Smith.  
SYN.—Bos indicus, Plinius.

Bos bubalus, Brisson.

Bos arnee, Shaw.

Bubalus ferus Indicus, Hodgson, apud Gray : List.

Bubalus Buffelus, Gray : List.

"Karbau" of the Malays of the Peninsula.

HAB.—*Pinang, Singapore, Malayan Peninsula, Tenasserim, Southern China*.

The wild buffalo is reported, but apparently without proof, to be indigenous in the Malayan Peninsula. Domesticated, it is very plentiful, and is the principal draft-cattle employed by the Malays and the Chinese settlers. The Black-coloured, apparently the hardier, is preferred by the Malays; the reddish-white, freckled with brown, is the greater favourite of the Chinese. Both are very slow, and as observed by Lieut. Col. Low, delicate, and liable to sudden attacks of disease if worked in the sun.

CETACEA.

HERBIVORA.

GEN.—HALICORE, Illiger.

(1133ss.) HALICORE INDICUS, F. Cuvier.

SYN.—Dugon, Buffon.

Trichechus Dugong, Erxleben.

Halicore cetacea, Illiger.

Halicore Dugong, Cuvier, apud Raffles.

Halicore Tabernacularum, Ruppell.

Dugungus marinus, Tiedemann, apud Schinz.

"Duyong" or "Parampuan Laut" of the Malays of the Peninsula.

HAB.—*Singapore, Malayan Peninsula, Sumatra, Philippine, Molucca and Sunda Islands, New Holland, Red Sea*.

The Duyong appears not to be numerous at Singapore, still less so to the northward, and has but in few instances been observed in Kwala Muda, the mouth of the river, which forms the northern boundary of Province Wellesley.

ORDINARIA.

GEN.—DELPHINUS, Linne.

(1133tt.) DELPHINUS PLUMBEUS, Dussumier.

SYN.—Delphinus malayanus, Lesson, apud Cuvier.

"Parampuan Laut" of the Malays of the Peninsula.

HAB.—*Coasts of Pinang. Malabar Coast*.

The species, although very numerous, and rather heavy in its movements, is rarely captured, except by chance in fishing stakes. The stomach, of a single young individual observed, contained remains of small fishes, apparently *Clupea* and *Gluphisodon caelestinus*, Cuvier.

MAMMALIA OF MALAYAN PENINSULA AND ISLANDS.  
 NUMERICAL LIST OF MAMMALIA, *inhabiting the Malayan Peninsula and  
 Islands, and other localities.*

1	<i>Hylobates lar</i> , Ogilby.	Malayan Peninsula,	Siam, Burma, Tenasserim.
2	<i>Hylobates agilis</i> , F. Cuvier.	Malayan Peninsula,	Sumatra.
3	<i>Semnopithecus obscurus</i> , Reid.	Malayan Peninsula, Pinang, Singa- pore.	
4	<i>Semnopithecus albocinereus</i> , Schinz.	Malayan Peninsula,	Tenasserim.
5	<i>Semnopithecus cristatus</i> , Horsfield.	Pinang, Malayan Peninsula,	Sumatra, Borneo, Banka.
6	<i>Semnopithecus femoralis</i> , Horsfield.	Malayan Peninsula,	Borneo, Sumatra ? Java ?
7	<i>Cercopithecus cynomolgus</i> , Ogilby.	Pinang, Malayan Peninsula,	Sumatra, Java, Banka, Borneo, Celebes, Timor, Tenasserim, Ni- cobars.
8	<i>Papio nemestrinus</i> , Ogilby.	Pinang, Malayan Peninsula,	Sumatra, Borneo.
9	<i>Nycticebus tardigradus</i> , Waterhouse.	Pinang, Malayan Peninsula,	Java, Siam, Arracan, Tenasserim, Bengal, Silhet, Assam.
10	<i>Galeopithecus Temminckii</i> , Water- house,	Malayan Peninsula and Islands,	Pelew Islands, Borneo, Java, Su- matra, Siam.
11	<i>Rhinopoma Hardwickii</i> , Gray.	Malayan Peninsula,	Southern Mahratta country, Cal- cutta, Allahabad, Agra, Mirza- pore.
12	<i>Megaderma spasma</i> , Geoffroy.	Pinang, Singapore, Malayan Pen- insula.	Fernate, Java.
13	<i>Nyctinomus tenuis</i> , Horsfield.	Malayan Peninsula.	Borneo, Java, Sumatra.
14	<i>Tuphous melanopogon</i> , Temminck.	Pulo Tikus, Lancavy, Malayan Pen- insula,	Java, Caves of Kanner.
15	<i>Tuphous Saccolaimus</i> , Temminck.	Pinang.	Celebes, Borneo, Java, Sumatra, Southern India.
16	<i>Rhinolophus affinis</i> , Horsfield.	Pinang.	Java.
17	<i>Hipposideros diadema</i> , Gray.	Pinang, Malayan Peninsula.	Timor.
18	<i>Hipposideros nolilis</i> , Gray.	Pinang, Malayan Peninsula.	Amboyna, Timor, Java, Sumatra.
19	<i>Hipposideros vulgaris</i> , Gray.	Pinang,	Java.
20	<i>Hipposideros murinus</i> , Gray.	Pinang,	Southern Mahratta country, Ni- cobars.
21	<i>Hipposideros galeritus</i> , Cantor.	Pinang.	



MAMMALIA OF MALAYAN PENINSULA AND ISLANDS.

22	<i>Vespertilio adversus</i> , Horsfield ?	Pinang.	Java, Calcutta.
23	<i>Kirivoula picta</i> , Gray.	Pinang.	Borneo, Java, Sumatra.
24	<i>Kirivoula tenuis</i> , Gray.	Pinang.	Borneo, Java, Sumatra.
25	<i>Trilatitulus Horsfieldii</i> , Gray.	Pinang.	Java, Sumatra.
26	<i>Scottophilus Temminckii</i> , Gray.	Malayan Peninsula and Islands.	Timor, Borneo, Java, Sumatra, Calcutta, Pondicherry.
27	<i>Pteropus edulis</i> , Geoffroy.	Malayan Peninsula and Islands.	Java, Sumatra, Banda, Bengal, Assam.
28	<i>Cynopterus marginatus</i> , F. Cuvier.	Malayan Peninsula and Islands.	Java, Sumatra, Southern Mahratta country, Bengal, Nipal.
29	<i>Tupaia ferruginea</i> , Raffles.	Pinang, Singapore, Malayan Peninsula.	Borneo, Java, Sumatra.
30	<i>Gymnura Rafflesii</i> , Vigors and Horsfield.	Malayan Peninsula, Singapore.	Sumatra.
31	<i>Sorex murinus</i> , Linne.	Pinang.	Java, Sumatra.
32	<i>Helarctos malayanus</i> , Horsfield.	Malayan Peninsula.	Sumatra, Tenasserim, Assam, Nipal.
33	<i>Arctictis Binturong</i> , Fischer.	Malayan Peninsula.	Arracan, Tenasserim, Assam, Nipal, Bhotan.
34	<i>Putorius nudipes</i> , Fred. Cuvier.	Malayan Peninsula,	Borneo, Sumatra.
35	<i>Mustela flavigula</i> , Boddaert.	Malayan Peninsula,	Java, Sumatra, Nipal.
36	<i>Lutra Nair</i> , F. Cuvier.	Malayan Peninsula,	China, Bombay, Southern Mahratta country.
37	<i>Lutra Barang</i> , Raffles.	Malayan Peninsula,	Borneo, Sumatra.
38	<i>Aonyx leptonyx</i> , Gray.	Malayan Peninsula, Singapore,	Java, Sumatra, Nipal.
39	<i>Cuon primævus</i> , Hodgson.	Malayan Peninsula,	Bengal, Nipal.
40	<i>Viverra Zibetha</i> , Linne.	Pinang, Singapore, Malayan Peninsula.	Southern China, Siam, Bengal, Khasyah Hills, Nipal.
41	<i>Viverra Tantalunga</i> , Gray.	Pinang, Singapore, Malayan Peninsula,	Amboina, Celebes, Borneo, Philippine Islands, Sumatra.
42	<i>Viverricula malaccensis</i> .	Malayan Peninsula, Singapore,	China, Philippines, Java, Cochinchina, Tenasserim, Bengal, Nipal, Hindoostan, Dukhun, Bombay.
43	<i>Prionodon grasilis</i> , Horsf.	Malayan Peninsula,	Borneo, Java, Sumatra.

MAMMALIA OF MALAYAN PENINSULA AND ISLANDS.

44	<i>Paguma leucomystax</i> , Gray.	Malayan Peninsula, Singapore,	Sumatra.
45	<i>Paguma trivirgata</i> , Gray.	Malayan Peninsula, Singapore,	Moluccas, Tenasserim.
46	<i>Paradoxurus musanga</i> , Gray.	Pinang, Singapore, Malayan Peninsula,	Pinor, Borneo, Java, Sumatra.
47	<i>Paradoxurus Derbyanus</i> , Gray,	Malayan Peninsula,	Borneo.
48	<i>Cynogale Bennettii</i> , Gray.	Malayan Peninsula,	Borneo, Sumatra.
49	<i>Herpestes Javanicus</i> , Desmarest.	Pinang, Malayan Peninsula,	Java.
50	<i>Herpestes auropunctatus</i> , Hodgson.	Malayan Peninsula,	Bengal, Nipal, Scinde, Afghanistan.
51	<i>Herpestes griseus</i> , Desmarest.	Malayan Peninsula,	Bengal, Hindocstan, Scinde, Nipal.
52	<i>Herpestes brachyurus</i> , Gray.	Malayan Peninsula,	
53	<i>Felis tigris</i> , Linne.	Malayan Peninsula,	Ceylon, India.
54	<i>Felis leopardus</i> , Schreber.	Malayan Peninsula,	India.
55	<i>Felis marmorata</i> , Martin.	Malayan Peninsula,	
56	<i>Felis Javanensis</i> , Desmarest.	Pinang, Malayan Peninsula,	Java, Sumatra?
57	<i>Felis planiceps</i> , Vigors and Horsfield.	Malayan Peninsula,	Borneo, Sumatra.
58	<i>Felis domestica</i> .		
59	<i>Sciurus bicolor</i> , Sparrm.	Pinang, Malayan Peninsula,	Borneo, Java, Sumatra, Siam, Tenasserim, Assam, Nipal.
60	<i>Sciurus Rafflesii</i> , Vigors and Horsfield.	Malayan Peninsula,	Borneo, Java, Canton Province.
61	<i>Sciurus hippurus</i> , I. Geoffroy.	Malayan Peninsula,	Java, Sumatra, Assam, Canton Province.
62	<i>Sciurus Villatus</i> , Raffles.	Pinang, Singapore, Malayan Peninsula.	Borneo, Java, Sumatra, Canton Province.
63	<i>Sciurus nigrovittatus</i> , Horsfield.	Malayan Peninsula,	Borneo, Java, Sumatra, Canton Province.
64	<i>Sciurus tenuis</i> , Horsfield.	Malayan Peninsula, Singapore,	Borneo, Java, Sumatra, Canton Province.
65	<i>Sciurus laticaudatus</i> , Diard. Var.	Malayan Peninsula.	
66	<i>Pteromys nitidus</i> , Geoffroy.	Pinang, Singapore, Malayan Peninsula,	Borneo, Java, Sumatra.
67	<i>Sciuropterus Horsfieldii</i> , Waterhouse.	Malayan Peninsula.	Java? Sumatra?
68	<i>Sciuropterus genibarbis</i> .	Malayan Peninsula,	Java.



# MAMMALAYA OF MALAYAN PENINSULA AND ISLANDS.

69	<i>Mus bandicota</i> , Bechst.	Pinang, Malayan Peninsula,	Southern Mahratta country, Bengal, Nipal.
70	<i>Mus decumanus</i> , Pallas.	Cosmopolita.	
71	<i>Mus setifer</i> , Horsfield.	Pinang,	Borneo, Java, Sumatra, Van Diemen's Land.
72	<i>Mus rufescens</i> , Gray.	Pinang,	Dharwar, Madras, Bengal, Arracan.
73	<i>Mus musculus</i> Linne ?	Pinang,	
74	<i>Rhizomys sumatrensis</i> , Gray.	Malayan Peninsula,	China, Moulmein, Assam.
75	<i>Hystrix longicauda</i> , Marsden.	Malayan Peninsula,	Borneo, Java, Sumatra.
76	<i>Atherura fasciculata</i> , Cuv.	Pinang, Malayan Peninsula,	Borneo, Java, Sumatra.
77	<i>Manis Javanica</i> , Desmarest.	Pinang, Malayan Peninsula,	Borneo, Java, Sumatra.
78	<i>Elephas indicus</i> , Linne.	Malayan Peninsula,	Borneo, Burma, Siam, India, Ceylon.
79	<i>Sus indicus</i> , Schinz.	Pinang, Singapore, Lancavy, Malayan Peninsula,	Bengal, Nipal, Southern Mahratta country,
80	<i>Sus scrofa</i> , Var. Linne.	Malayan Peninsula and Islands,	China.
81	<i>Rhinoceros unicornis</i> , Linne.	Malayan Peninsula,	Bengal, Assam, Nipal.
82	<i>Rhinoceros Sondaicus</i> , Cuv.	Malayan Peninsula,	Java.
83	<i>Rhinoceros Sumatranus</i> , Raffles.	Malayan Peninsula,	Sumatra, Tenasserim.
84	<i>Tapirus malayanus</i> , Raffles.	Malayan Peninsula,	Borneo, Sumatra.
85	<i>Equus caballus</i> , Linne.	Introduced in the Malayan Peninsula and Islands.	
86	<i>Tragulus Kanchil</i> , Gray.	Pinang, Singapore, Lancavy, Malayan Peninsula,	Java, Sumatra.
87	<i>Tragulus Javanicus</i> , Pallas.	Malayan Peninsula.	Borneo, Sumatra, Java.
88	<i>Stylloceros Muntjak</i> , Ham. Smith.	Malayan Peninsula.	Borneo, Banka, Java, Sumatra, Tenasserim, Nipal, Assam, Bengal, Southern Mahratta, Duhun.
89	<i>Axis maculatus</i> , H. Smith.	Malayan Peninsula, Pinang,	Sumatra, Bengal, Assam, Nipal, Southern Mahratta country, Ceylon.
90	<i>Rusa equina</i> , H. Smith.	Pinang, Malayan Peninsula,	Borneo, Sumatra.

# MAMMALIA OF THE SOMALI COUNTRY.

91	<i>Panolia acuticornis</i> , Gray ?	Malayan Peninsula,	●
92	<i>Nemorhedus sumatrensis</i> , Ham. Smith.	Malayan Peninsula,	Sumatra, Tenasserim.
93	<i>Bos gour</i> , Trail.	Malayan Peninsula,	Tenasserim, Hindostan, Assam, Nipal, Southern Mahratta country.
94	<i>Bos taurus</i> , Var. <i>indicus</i> , Lin.	Introduced in the Malayan Countries.	
95	<i>Bubalus arnee</i> , H. Smith.	Ditto.	
96	<i>Ilalicore indicus</i> , F. Cuv.	Singapore, Malayan Peninsula,	Philippines, Moluccas, Sunda Islands, Sumatra, New Holland, Red Sea.
97	<i>Delphinus plumbeus</i> , Dussumier.	Malayan Seas,	Bay of Bengal.

*Note to GEN. NYCTINOMUS*, A male *Nyctinomus bengalensis*, Geoffroy, (*Syn. Vespertilio plicatus*, Buchan.—*N. bengalensis*, Geoffroy, apud Horsfield.—*Dysopes plicatus*, Temminck, apud Schinz,) examined after the Catalogue had passed through the press, exhibited a true cæcum. The entire length of the animal was  $4\frac{3}{8}$  inches, of which the tail measured  $1\frac{5}{8}$  inch. Extent of the flying membrane : 1 foot  $0\frac{4}{8}$  inch.

Length of the small Intestine,..... $9\frac{1}{8}$  inches.

„ „ large ditto,..... $4\frac{1}{8}$  „

„ „ cæcum,..... $0\frac{3}{8}$  „

The cæcum is crescent-shaped, with the concave curvature firmly adhering to the external surface of the small intestine. The convex curvature presents near the apex a sacculated appearance; the membranes are thickened. Where the cæcum joins, the small intestine and the rectum are narrowed.—*Fort William*, Dec. 11th, 1846. *Ben. As. Soc. Journal*, No. CLXXII of 1846.

## (1134) MAMMALIA OF THE SOMALI COUNTRY.

(1135) *Canis variegatus*, Ruppell. “The Somali Jackal.” He carries off kids and lambs, rather disdaining garbage; and unless driven away by dogs, he is capable of doing great damage to the flocks. The Somali call him Dowao.

(1136) *Hyæna crocuta*? (Erxleben), var.? Bright fulvous Hyæna, with dark spots not very distinct, and a black tail-tip: probably of the race termed *H. crocuta rufa* by Fischer, and which Dr. Gray refers to *H. brunnea*, Thunberg (*H. rufa*, Cuv. and *H. fusca*, Geoffroy), (*Note*. This name more probably refers to the specimen

Foss, VII, 318 (4th edit), and which is evidently *H. Villosa*, A. Smith (Lin. Trans. XV, pt, 1, 461) from South Africa (Pt. Natal); but which is not the ‘Strand Wolf’ of the Cape colonists (who term the common Spotted Hyæna the ‘Tiger Wolf’), or *H. Villosa*, A. Smith, which Dr. Gray considers to be a S. African variety of *H. striata*, Zimmerman, the common striped Hyæna of Asia and N. Africa. We have seen *H. villosa* alive, and have minutely compared its skull with skulls of the spotted and of the striped Hyænas; and arrived at the conclusion that it was a distinct species, nearly affined to *H. striata*, but with the solitary true molar less developed, though more so than in *H. crocuta*. Vide also Cuvier, *Oss. Foss* VII, 319 (4th edit.) Dr. Gray even institutes a genus *Crocota*, to which he refers as species *Cr. maculata* (*Canis crocuta*, Erxleben, *Hyæna maculata*, Humb., v. *H. capensis*, Desmarest), the ordinary spotted Hyæna, and *Cr. brunnea* (with synonymes as before cited). The Somali animal is probably the latter. “The Somali call it *Waraba*,” “or *Durwa*.” It is common to all the Somali country, whines about the camp all night, and devours anything it can find during the day, pulling down camels and even children. The natives have many superstitions about this animal, and you often hear of a man being called *Waraba* after his proper name, the idea being that by rubbing certain plants over the body the magician can convert himself like Mars into a Wolf. In the cold season when the *Waraba* is hungry he attacks man. The Somalis all declare this animal



capulated with alternately." (*Vide* Pliny VIII. 30; as cited by Cuvier, *Oss. Foss.* VII. 312, 4th edit.)

(1137) *Mungos fasciatus*; *Herpestes fasciatus*, Desmarest: *Vicerra mungo*, Kämpfer; *V. ichneumon*, Schreber (from Buffon, III, t. 19); *H. Zebra*, Ruppell; *Ryzsena suricata* apud Children, 'Appendix to Clapperton's Travels', called the *kaduf*. "These animals run about in large batches, and defend themselves savagely when wounded. They inhabit the plateau, burrow deep, and when pursued endeavour to escape by hiding themselves: yet with characteristic curiosity, they must peep out of their asylum after a few minutes' concealment."

(1138) *Felis caracal*, Schreber. "Called by the Somalis *Jumbil*. It is principally found in the plains."

(1139) *Xerus rutilus*; *Sciurus rutilus*, Ruppell: *X. brachyotus*, Hemprich and Ehrenberg, apud Gray. "Ground Squirrel, called *Daba-kulla*. It abounds all over the country, burrows especially into deserted ant-hills, and under dead trees. The testes of the male are enormous; and the colour of the coat is glossy and brilliant."

(1140) *Pectinator* (n. g.) *Spekei*, Blyth, n. s. 'Common Rat. Barabduhl. Inhabits stony ground, like the *Hyrax*.' This highly interesting rodent belongs to a peculiar N. African group, of which one species only appears hitherto to be tolerably known, the *Otenodactylus Massonii*, Gray. (*Note.* *Vide* a notice of the anatomy of this animal; by Mr. Yarrell, in *Proc. Zool. Soc.* 1831, p. 49. A second species would seem to exist in the *Mus gundi*, Rothman or *Gandi Marmot* of Pennants. 'Zoology'; which, being described to be of the "size of a small Rabbit," and of a "testaceous-red colour" can scarcely (as remarked by Dr. Gray) be specifically identical with *Ot. Massonii*, even though from the same country, Barbary. The fur of *Ot. Massonii* is pale yellowish-brown; and its tail is described by Mr. Yarrell to be 1 inch long. The *Gundi* is merely stated to have a "short tail." Accordingly, the following (obviously another of the same group and region), with rudimentary tail "but just perceptible to the touch," is probably a third species, which was observed by Captain Lyon in the mountains north of Tripoli. That traveller informs us, that "It much resembles a Guinea-pig in form, but is of a light brown mouse-colour. Fur longer than that of a rat, and very silky; eyes black, large, and prominent. Orifices of ears, which are quite flat against the sides of the head, also black, and free from hair; the tail, or rather a little stump in place of one, is just perceptible by the touch, and from it grows a tuft or bunch of long black hairs. The body is very round and fat, and particularly broad at the shoulders. These animals burrow amongst the rocks. They are eaten with great relish by the natives, and no doubt are very

good, as the flesh is exceedingly white and fat, and resembles that of a Rabbit."—*Travels in Barbary*, page 32.) The animals of this group are clad with delicately soft fur, have very long moustaches, and four toes only on each foot. The palms and soles are naked, the latter to the heel or tarsal joint; and the entire length of the tarse is brought to the ground when walking. Over each claw is a curving tuft of stiffish bristles, more conspicuously developed on the hind-feet; and the innermost toe of the hind-foot has a peculiar combing apparatus, which has been described by Mr. Yarrell in the instance of *Otenodactylus Massonii*. "With this comblike instrument," remarks that naturalist "the little animals were observed [in the London Zoological Garden] to be continually dressing their soft fur; and the facility with which they managed to reach every part of each lateral half with the toe of the foot on that side, as well as the rapidity of the motion, were very remarkable." The muzzle is completely furred; and the rudimentary or short tail is furnished with long hair (as in the *Sciuridæ*). The rodential tusks are narrow and rounded; and in *Otenodactylus* there are only three molars on each side above and below, and which are surrounded with enamel, the upper having one deep indentation externally, the lower being indented on both sides. In our new genus there is a small and simple fourth molar anteriorly above and below: and the next to it above is smaller than the third and fourth, and seems to have no distinct indentation (the molars being, however, much worn away by attrition in the specimen examined). The lower jaw of *Pectinator* is very remarkable for showing no indication even of a coronoid process; a fact not mentioned by Mr. Yarrell in his description of the anatomy of *Otenodactylus*. The condyle is small, and articulates on a level with the crowns of the molars. The auditory bullæ are remarkably large and are seen from above (as in *Chinchilla*.) The antiorbital foramen is large. Palate contracted, narrowing to the front; and the post-palatal emargination is continued forward to a line with the middle of the last molar; externally, *Pectinator* is distinguished from *Otenodactylus* by having the tail and ear-conch well developed; a smaller eye; and apparently a general adaptation for more diurnal and less fossorial habits. The eyes are scarcely so large as in a common Rat. The auricles are broadly ovoid, subnude, with a fringe of whitish hairs on their anterior margin, and a patch of dense whitish fur at base on their outer surface. Length of *P. Spekei*, from nose to base of tail, about 6 inches; and tail probably  $2\frac{1}{4}$  inches; or with hair  $3\frac{1}{4}$  in.; Tars: with toes  $1\frac{3}{8}$  inches. Auricle (measured posteriorly)  $\frac{1}{2}$  in. The skull measures  $1\frac{7}{8}$  in. in length and  $1\frac{1}{8}$  inch in greatest breadth (at the *zygomata* posteriorly); between the orbits somewhat ex-

## MAMMALIA OF SOMALI.

ceeding  $\frac{1}{2}$  inch. Fur, soft and moderately long, of a sandy grey-brown colour, slightly washed with rufous especially on the crown; the basal half of the piles pale dusky: at the *nates*, the fur is more dense and woolly, and rufescent-whitish or pale isabelline: the moustaches are chiefly black, and the longest of them measure about 3 inches; the hairs upon the tail are shorter towards its base, then lengthened as in the Squirrels; these long hairs being of a sullied or isabella white for the basal half, and then black with a white tip: hence, in the living animal, the bushy tail would appear whitish along its middle, with broad black lateral and longitudinal bands, which again are fringed externally with dull white: hairs upon the feet whitish, the tufts or brushes over and impending the kind-claws shewing conspicuously: the combing apparatus of the innermost hind-toe consists of some exceedingly harsh and stiff short bristles immediately impending (but shorter than) the claw, and above these again are some equally short bristles which are not quite so rigid; over which is finally the long incurved tuft of finer bristles, the lower most of which are shorter and more rigid than the upper: on the next toe the same remarkable structure is seen, and more easily felt, but is considerably less developed. This discovery of a second generic form of a peculiar group, hitherto represented only by *Ctenodactylus* (which has long stood quite isolated among other *Rodentia*), will be hailed with some satisfaction by those who have paid attention to the classification of the order, and will tend to remove such doubts as may exist of the propriety of recognising this as a separate family (however limited, according to present knowledge), about equivalent to the Chinchillidæ of South America, to which, upon the whole, the *Pectinatoridæ* would seem to be more nearly affined than to any other known form. It is highly probable, however, that more species and even generic forms remain to be discovered of this peculiarly African family; and that it will prove to be at least as extensive as the *Chinchillidæ*; and perhaps that even *Petromys* should be admitted within its extreme confines. Capt. Lyon's Tripoli animal, with tail reduced to a mere tubercle, is certainly one species which has not yet been scientifically examined; and the *Gundi Marmot* of Pennant is probably another: but these little mouse-coloured rodents seldom attract the attention of unscientific collectors; unless, indeed, it should so happen that their attention had been especially directed to them.

(1141) *Hyrax habessinicus*, Hemprich and Ehrenberg: *Ashkoko* of the Appendix to Bruce's Travels; recognised as a distinct species by Dr. Gray; but referred by Dr. Ruppell to *H. damar*, Cuvier, v. *syriacus* of Schreber. Half-grown specimen. "The Somal call it *Bauni*. It inhabits rocky ground and delights in sunning itself,

## MAMMALIA OF SOMALI.

running about the rocks, and living in cliffs and holes. Neither Lt. Speke nor I ever saw it in the plains. The Arabs here eat it, but the Somal do not."

*Gazelle* —? Heads of male and female, of one of the several species which have been more or less confounded under *G. dorcas*; and quite distinct from the common Aden Gazelle, which is frequently brought alive to Calcutta. One marked peculiarity consists in the ears being of an ash-grey colour, contrasting strongly with the hue of the neck and doubtless also of the body. Horns robust, curved backward and then upward, and diverging but slightly; much longer, and with the annuli wider apart, than in the Aden Gazelle, though the animal would seem to be of the same size. The horns of the female are very much stouter than we have seen in any other female Gazelle, and follow the same curve as in the male, having rudimentary annuli. Muzzle whitish, with a strongly contrasting black nose-patch. The Society possesses a species of Gazelle (habitat uncertain), which much resembles the Aden Gazelle except in being considerably larger, with proportionally longer and more distantly knobbed horns, much as in the present race: but both of these have the ears rufescent and not ashy. At present, we are far from being satisfied with the manner in which Dr. Gray has brought together sundry of these refined races of Gazelle, in the *Proc Zool. Soc.* for June 11th, 1850 (*Ann. Mag. N. H.* VIII, 1851, p. 131). It seems like cutting rather than unravelling of the tangled knot. Lt. Burton writes—"A kind of Gazelle called by the people *Dera*, as you may observe that there is an elevation of loose replicated skin upon the nose. It seems to live during the dry season without water, and affects the desert, not being very shy in presence of man, but avoiding jungle. They are found in flocks."

(1142) *Madoqua saltiana*; *Antelope Saltiana*, Blainville; *A. madoqua*, H. Smith. A beautiful skin of a male; and heads of two other males and of a female. "This little Antelope is called *Sagaro*, by the Somal; *Beni Israel* in Abyssinia; and *Ghazalak* by the Arabs. It abounds throughout the country generally in pairs, and is fond of ravines under hills, the beds of nullahs, and patches of desert vegetation. In the northern Somali country, these Antelopes are caught in snares: elsewhere they are run down on foot, taking half a day on account of their great swiftness. The Jackal (*Canis variegatus*) cannot catch them. They sleep by day under the trees; and in the plains their dung (which becomes peculiarly fetid with a musky odour in the sun) is found in heaps as if they assembled for that purpose." Many animals resort habitually to one place to deposit their dung; among them the Indian Rhinoceros, which in the Rajmahal hills is watched for and shot by the natives at such



## MANGANESE ORES.

places; and we have observed the Indian four-horned Antelope to exhibit the same propensity, when tame and loose in a large enclosure.

(1143) *Oreotragus saltatrix*; *Antilope oreotragus*, Forster: *A. saltatrix*, Boddart. The 'Klip springer' of the Cape colonists. A kind of Antelope called *Alakrut*. They live in the higher ranges of the mountains, only in pairs, and are not unlike the musk-deer in coat. They are by no means shy, seldom flying before the foot-fall is heard. They hop in an awkward manner on the points of the hoof at no great pace or distance at a time. The people of the country prize the venison.—*Mr. Blyth in Beng. As. Soc. Jour. Vol. IV, 1855, specimens sent by Captain Burrton from Somali country.*

(1144) MANAGOOT OR MANGOOSTEEN. *Malay. GARCINIA MANGOSTANA.*

(1145) MANDRAKE PLANT. *ATROPA MANDRAGORA*, Liu.  
Ustrung, ARAB. | Luckmuna, luckmunec,  
Murdumi geca, PERS. | HIND  
Caat-jootie.

The root of this plant was formerly an article of the British Materia Medica. The leaves were till recently employed in preparing anodyne fomentations. The Arabians place the root, which they call Ussul-ul-loofah, amongst their most powerful cathartics, and also suppose it to be of use as an antispasmodic. What of it is found in India is probably brought from Persia or Arabia.—*Ains. Mat. Med. page 26.*

(1146) MANGAI OR MANGOE, the Malayala name of the mango tree which is known throughout India. It grows to a large size, many trees are found three feet in diameter, and thirty feet high. The wood is of a whitish colour, and is not durable or of much value. The natives make canoes of it.—*Edye Mal. and Can.*

(1147) MANGANESE ORES. At the Madras Exhibition of 1857, one very rich ore of manganese was exhibited from Vizianagrum, and another from Bimlipatam.

They occur in huge veins from 3 to 5 feet in thickness, amongst primitive granites, and were forwarded by the Zemindar of Vizianagrum. Some of the blocks weighed from 3 to 4 cwt. They have been very accurately described and carefully analysed by Dr. Scott who mentions that this mineral presents a highly metallic lustre of a bluish black color, interspersed here and there with dull greyish spots, which latter possess the external character of Psilomelan; The sample from Vizianagrum breaks with difficulty and when split with a chisel presents an imperfect rhombohedral cleavage, its sp. gr. is 4.50. When powdered it assumes a dark brownish black color, it dissolves readily in hydrochloric acid with the evolution of chlorine gas, and on evaporation forms a gelatinous mass of a deep yellow color. After a careful

## MARDA MARUM.

analysis the quantitative constitution was found to be as follows:—

Silicic acid, . . . .	8.300	Red oxide of
Peroxide of iron, 12.910		manganese . . . .
Magnesia, . . . . .	2.339	Oxygen, . . . . .
Water and loss, 0.801		1.864

The quantity of metallic manganese in the above analysis amounts to 63.428 per cent, and the total quantity of oxygen combined, therewith to 22.219; it corresponds very closely to the constitution of sesquioxide or of a mixture of protoxide and peroxide. It is protected from oxidation by being a silicate. It agrees most nearly with a manganese ore called marcellin from mount Marcel in Piedmont investigated by Damour. The sample of ore from Bimlipatam was also subjected to a careful quantitative analysis, and was found to differ in containing lime, its composition was as follows:

Silicic acid, . . . .	9.090	Red oxide of man-
Peroxide of iron, 11.720		ganese . . . . .
Lime, . . . . .	1.244	Oxygen, . . . . .
Magnesia, . . . . .	0.668	Water, . . . . .
		Loss, . . . . .
		0.014

It therefore contains metallic manganese 54.929, oxygen 22.558. To constitute a true sesquioxide, 23.904 of oxygen would be required. It would thus appear that the metal is in a lower state of oxidation than in the Vizianagrum specimen. These ores are of little or no commercial value, but they have been found of use in producing strong black, purple, and brown glazes for pottery.—*M. E. J. R.*

## (1148) MANGIFERA OPPOSITIFOLIA.

Mayan, Bur.

Grows wild in most parts of the Burmese country. It is a lofty spreading tree. Fruit, yellow; the size of a plum. There are several varieties, of which some are sweet, and others sour. It is an excellent fruit, but does not grow in the upper provinces.—*Malcom's Travels in South Eastern Asia, Vol. I, p. 179.*

(1149) MANGUIAN, the name applied in Mindoro to the aboriginal tribes occupying the interior of that island.—*Jour. Ind. Arch.*

(1150) MANI was a Persian (temp. Sapore 300 A. D.) he pretended to be the Paraclete promised in John, Chapter 14, &c. and soon established a sect, but was persecuted by Sapore, on which he fled to Eastern Tartary. While here he engaged in drawing and produced a great many extraordinary figures which his followers on his return believed were given to him in heaven, where he informed them he had spent the time during his retreat. His religion is known to Europeans as the Manichean, a mixture of Magian, Hindu, Christian and Mahomedan doctrines and many, even Christian Patriarchs and Bishops, followed him.—*Journ. Ind. Arch. No. 8, Vol. V. August 1851.*

(1151) MARDA or MARTHU or MARTHA marum. *TERMINALIA species?* in Tamil and

## MEHDI OR MUHDEE.

Malayala, and Martha in Canataca, Malabar and Canara, &c.

This tree is of large dimensions and perfectly straight; it is of a dark brown colour and very close-grained, many trees are to be found on the banks of the Maletur river, of a hundred feet long, and about twenty four inches in diameter. From the apparent qualities and native uses of this wood, there is no doubt that it might be converted with advantage into plank, thick-stuff, beams, &c. for ships, where strength is required, and where weight is of little consideration. It runs from sixty-two to seventy pounds the cubic foot, when green: the native carpenters use it with the teak for beams in the pagodas, &c., it is considered durable; and contains a quantity of oil.

The forests in Travancore abound, with trees of this sort which can be obtained on the rivers bank,—an important consideration in the expense of procuring such valuable wood.

There is an inferior description which is named *Villai Marda marum*, *Terminalia Berryii*? or white marda; it much resembles the former tree, excepting in size and in leaf, both of which are considerably smaller, and it is said by the natives to be inferior in quality and durability; it is more like the English oak in grain than any wood Mr. Edye met with. These trees, and also the former sort, are found in patches of some hundreds together, and generally on the banks of rivers.

There is another sort named *Villai Katti Marda*, *Terminalia*, *species*, which is the white marda.—This tree grows to about twelve or fifteen inches in diameter, and twenty-five feet long.

In Malabar, there is another sort, which is well known to the natives by the name of *Kalu Vitte Marda*, and may be considered of the same quality as the last sort. I should have said that this is the dark stone Marda. It is used for the frames of vessels, and many other purposes, for which it is said to answer well.—*Edye, M. and O.*

(1152) **MARUTI**, the Malayala name of a tree which grows to about fourteen inches in diameter, and twenty to twenty-four feet high. It produces a fruit which the natives use as a medicine, and from which also they extract an oil which they use in lamps, and in anointing the body after bathing.—*Edye, M. and O.*

(1153) **MAY A AH**, *Burm.* Is the size of an apple tree. Fruit excellent, size of a plum, purple colour; sweet, small seeds. It is said to grow in the celestial regions, and to be a favourite food of the Nats.—*V. I. p. 180.*

(1154) **MAYAN OR MARIAN**. Burmese, *MANGIFERA OPPOSITIFOLIA*.

(1155) **MEHDI OR MUHDEE**, the twelfth and last Imam, Mohummud surnamed Mehdi; i.e., director and leader, whom the Persians believe to be still alive, and that he will re-appear with

## MICA.

Elias the prophet on the second coming of Jesus Christ.—*Herkt.*

(1156) **MENANGKABITE STATES**. These states lie between Malacca and Salangor, on the one side, and Palhang on the other.—*Journ. Ind. Archipel.*

(1157) **MENISPERMUM HIRSUTUM**.

Roughmood seed, ENG.	Dier hier, dusera tiga,
Menisperme hersute, FR.	INDIAN and CASHM.
Mendsame rancher, GER.	Doosra tiga, TELING.
Frid mull butee, PERS.	

A twining plant, found in most hedges. It flowers during the wet season. The juice of the ripe berries makes a good, durable, blueish purple ink. A decoction of the fresh roots, with a few heads of long pepper, in goat's milk, is administered for rheumatic, and old venereal pains: half a pint every morning is the dose. It is reckoned heating, laxative, and sudorific.

The fresh leaves taste simply herbaceous. Rubbed in water they thicken it into a green jelly, which is sweetened with sugar, and drank when fresh made, to the quantity of half a pint, twice a day for the cure of heat of urine in gonorrhœa. If suffered to stand a few minutes, the gelatinous or mucilaginous parts separate, contract and float in the centre, leaving the water clear like Madeira wine, and almost tasteless. Curry is made of the leaves, for people under a course of the roots, or jelly of the leaves. Goats, cows, and buffaloes eat it.—*Roxburgh's Flora Indica, Vol. III. p.p.814, 15.*

(1158) **MERIAH**. The name given to the human sacrifices in Orissa, where young persons are sacrificed to propitiate the divinity supposed to preside over the soil.

(1159) **ME-YAH**. *Burm. GREWIA.*

(1160) **MICA**, of the Behar Mica Mines. The principal Mica mines of Behar, are situated on the northern face of the Vindhya hills, where the three districts of Behar, Monghyr and Ramghur meet. The most westerly situated mine is thirty-seven miles in a south-easterly direction from Gya, and is in the district of Behar: the most easterly mine is about sixty miles distant in zillah Monghyr, the whole of the intermediate sixty miles being more or less productive of the mineral. The average distance from the Ganges of the whole aggregated group of mines is sixty miles.

Those mines only which lie within the boundary of the district of Behar are worked, those within the district of Monghyr, from some unknown reason, are neither worked nor regarded as of any value by the owners of the estates in which they lie.

The mica reaches the surface in three different states, viz. the good, hard and serviceable mineral; the soft, wet and flimsy mineral; and the chipped and powdered mineral.

The tests as to whether the mica is good for any thing, or whether as the natives say "it is



alice" are its firmness, specific gravity, and the power of reflecting the countenance free of contortions; the latter test we imagine showing the perfect parallelism of its individual plates, and consequent likelihood to split well; the heavier the mineral and the more perfect the reflection, the more valuable is the mineral considered; all the plates not standing the necessary test, are of a soft and flimsy nature without any of the brilliant sparkle of the better sort, the natives call this the "dead mica," and it appears to be in a state of decay.

The plates of the superior kind are used in all the large Gangetic cities and towns, by the native draftsman, whose beautiful productions in body colors, must be familiar to most people: by the lamp and toy makers; by the Mohammedans for ornamenting their Tazials; as well as for ornamenting umbrellahs, boats, and for making artificial flowers.

The second and third kinds are pounded and used for ornamenting toys, pottery, the inside of houses, for sprinkling over clothes and turbans at feasts, the sparkle from which by torch light resembles diamonds; but the great consumption of the inferior mineral takes place during the Hooli festival, during which period the "abeer" or pounded mica mixed with the flour of the small grain, "Koodo" and colored with some red coloring matter, is freely sprinkled over the maddened and intoxicated votaries of those bacchanalian orgies.—CAPT. SHERWILL, *Revenue Surveyor. Beng. As. Soc. Jour. No. IV, of 1851.*

(1161) MIEN-GA. *Burm. Cynometra.*

(1162) MICHELIA CHAMPACA, CHUMPA CHUMPA, HIND. CHAMPACA, RHEED. Champuka or Chumpa, BEN.

Cultivated for its fragrant flowers, it is a beautiful tree, the fruit is not eaten.—*Genl. Med. Top. p. 199.* A pretty large tree common in gardens in most parts of India; flowering time the rainy season; seed ripens in the cold season Roxb.—*Rhode, M. S. S.*

(1163) MILULU, the Malayala name of a tree that grows to about sixteen feet high, and ten inches in diameter. It is known as one of the jungle-woods, and is used by the native carpenters for boats' knees and timbers, on account of its strength.—*Edye, Mal. and Can.*

(1164) MILUM. A glacier in the Himalayas, 8 to 10 miles in length and 3000 feet broad.

(1165) MINAHASSA. Translated for the Journal Ind. Arch. from the Tjdschrift voor Neerlands Indie 7 e. y. 4 e. Deel.

Menado and Kimä, lie directly opposite each other on the West and East sides of the North Eastern peninsula of the large and rich Island of Celebes, have recently, by a resolution of the Netherlands Indian Government, been proclaimed open to foreign trade from the first of next month, and the following

notices of the province of Minahassa in which they lie, will be found interesting. See the resolution at length, Singapore Free Press, 5th October 1848. The preamble declares it to be the desire of the Government to give to the productions, the trade and the shipping of the different possessions of Netherlands India that development for which the condition of each best adapts it, and that this object can be best accomplished, as regards the residency of Menado, by placing it in the immediate, complete and unrestricted enjoyment of the natural advantages which it possesses in its position, fertility of soil, and the industry of its numerous population. It is therefore proclaimed that from the 1st of January 1849, Menado and Kima shall be free ports, where all goods without distinction, and under whatever flag, may be imported free of duty. Vessels are also to be free from tonnage, anchorage or harbour duties. Strangers are to be permitted to reside at the ports for the prosecution of trade.

*General Review.* The capital Menado is situated on a large and beautiful bay on west side of the northerly promontory of Celebes, in 1° 30'. N. Lat. and 124° 56'. East Long. Greenwich, according to the chronometers of the barque Sumatra, (Dec. 1843), according to Horsburgh in 124° 52' East Long. and according to Norrie 125° 0'.

*Cacao.* This product is cultivated in the high lands, but mostly on the coasts. The plantations of it are even now considerable, and this branch of industry only requires not to be impeded by any obstacles, in order to be still further extended. It forms a large ingredient in the trade, and furnishes many petty traders with their daily bread, not to speak of the landowners for whom the cultivation of the cacao affords the only subsistence. The preparation of this product here differs from that in the West Indies, 1,200 to 2,000 piculs of 125 pounds are yearly produced; the prices vary much; being from 50 to 75 florins.

The Sulphur lake Lienong, situated near the negory Lahendong, deserves notice. Half way between Sarongsong and Lahendong, there is observed on the road the sulphur exuding from the ground, and on the left, several sulphureous marshes. Every thing here is barren and rude, and nature waste and inhospitable. From the height at the back of negory Lahendong, is a glorious view. Turning to the west you behold, on both sides of the mountain Korey, the sea in the distance,—on the right, Lakon exposing its full dimensions,—at your feet the negory Lahendong,—at your back lake Lienong about half a mile in circumference, formed by the mountains Tolanko, Lingkoan, Kasuratan,—and Tempusu, below you. The glittering of the waters of the lake beneath is exceedingly beautiful, shewing, from the volcanic action, different colours. On the sides and at your feet

## MINERAL SPRINGS.

you see the sulphur and the hot-water boiling up from the ground, the last at a heat of 200° to 202° fah. so that in two minutes an egg may be boiled in it. Two prahus of hollowed trees bound to each other serve as a raft to reach the other side of the lake, where the aspect of nature is of a more terrific character. Here also the hot water runs from the walls and shore into the lake, but it is of a lower temperature than that on the other side. A boiling sulphur pool, thirty feet in diameter, first arrests attention. It has a temperature of 140. Fah. while all around and under you there is nothing but desolation and boiling water. It is necessary to be careful if you wish to extend your researches further up than the ordinary road. An experienced guide is indispensibly required, as this is the place where the count de Vidua lost his life in his zeal for exploration. Not listening to the advice of the natives around him, he fell into the boiling mud. Ses Tjcl. voor N. I. 5th I. deel I. blz. 306.

The sulphur vapour prevented us from remaining long here. Conducted by persons who knew the country, we observed, over some trees and low underwood, different places where the mud boiled up. It was remarkable that in the circumference of 30 or 40 feet, different degrees of heat were found, 135°, 171°, 145°, and lower, 165°. It was also very remarkable that the volcanic direction near this lake was east and west, and that the earthquakes there are felt in the same direction.

The lake, which is 10 feet deep, has an outlet through the district Sonder, and near the negory Tinji forms one of the most beautiful cascades yet known here.

In the lake Lienong, six different kinds of fish are found, viz, cabos, getegele, sayo lumulontik, komo and the largest kind of eels, and also a number of wild ducks and other water fowl. At noon the thermometer was 75° Fah.—*A Glance at Minahassa. By M. A. F. Van Spreuwenberg. Jour. of the Ind. Arch. Vol. II. No. XII. Dec. 1848, p. 833*

(1166) MINERAL SPRINGS, one of them occurs in the Saugur talook, Nuggur division of Mysore; mentioned by Dr. H. R. Oswald, M. D. *Cat. M. E. of 1857.*

1. *At Darjiling there is a Mineral Water in the Minchu Spring described by B. H. HODGSON, Esq., c. s.* The water is a carbonated and sulphuretted chalybeate spring, containing its iron in the peculiar state in which it is found in the Bath waters.

2. *Mineral Water, from a spring walled in, at Kudjorah in Jessore, from A. GROTE, Esq., c. s.*

This spring is a carbonated, calcareous and magnesian water, with a slight, though probably efficacious proportion of iron, which is of course in the state of carbonate, and held in solution in the water

*Mineral Water from Sosoneah, North of Hueshah from W. H. ELLIOTT, Esq., c. s.*

## MINERAL SPRINGS.

through Mr. GROTE. This water is a carbonated and slightly chalybeate spring, with a little muriate and carbonate of soda also in solution.

Hot springs in Martaban and Tenasserim, Petroleum springs in Pegu,...	Pegu.
Petroleum springs, Arracan and Assam, Seetacoond near Chittagong, Uteer 30 miles from Poree, ...	Aracan.
Hot Springs near Channeh in Bancoorah, ... Ditto ditto Sooree, ... Ditto ditto Rajmehal, Hills,...	Barrackpoor.
Hot springs near Channeh at Singoorjah, ... Ditto Pinarkoon, ... Ditto Kutkumsandee, At Mujoolee 30 miles S. E. of Rhotas, ...	
2 Springs in Hills N. E. of Gya, ...	
4 Sulphuretted springs within 27 miles of Hazareebaugh, ... Burkutta G. T. road, ... Seetacoond Moonghyr, ... Many hot springs in same range, ...	Dinapore.
2 Springs on Runjeet river Darjeeling, ...	
Springs at Landour, ... Well of Sonah near Delhie, ... Sulphurous spring at Gwalior, ...	Merrut. Gwalior
Many mineral springs at Macheny in Jeypore, ... Hot springs in Alwar, ... Hot and cold springs at Seetabaree in Hurrowtee, Soda springs in Rajpootana, ...	Agra.
Hot springs at Jummotrie, Gungotrie, ... Kedarnath and Budinath in Ghurwal valley of the Sutlej, ... Chalybeate at Nagconda, ... Munneekaran, ... Bishihst, ... Saline spring at Dreva near Shapore, ...	Umballa.
Sulphur ditto at Lonsah near Noorpore, ... Chalybeate at Dalhousie Chumba, ... Iodine and Brine near Juwalli Mukki, ... At Mukhdoor Rusheed 14 miles from Mooltan Sealkote.	Lahore.



## MOHURRUM.

Saline springs in Salt Range, Peshawur.  
Hot fountain in Kattywar.  
Also Saline and Sulphur springs within high water mark.  
Sulphurous well near Somnath.  
Saline springs in the Concan.  
Saline and Sulphurous springs in Lukee pass.  
Many hot springs on Western boundary.  
Ramandroog hills near Bellary.  
Chalybeate at Bangalore.  
Sulphuretted hot springs at Badrachellum on the Godavery.

Hot springs at Rair and Urjunah and at Byorah in the Deccan.—*Jour. Beng. As. Soc. No. III of 1856.*

(1167) MINTRA. A tribe on the Malay peninsula with numerous superstitions, but believing in another world. The Mintras are not so advanced in cultivation and arts as the Creans of the Tenasserim Coast, these last cultivate cotton, and make their own cloth, which is not the case with the Mintras. The Creans have also many vegetables which are unknown to this tribe. The Mintras clear a small piece of ground in March, in July they set fire to the trees which are then sufficiently dried, and at the beginning of September they plant Paddy, Cludy, &c., their Ladang is so small that their harvest of rice is enough only for a couple of months, the Cludy being then their only food for the remainder of the year. The Mintras are very partial to the flesh of monkeys, and if the use of it was not prohibited by the koran, there is no doubt that the generality of them would have been converted to Islamism. To procure it they use the Sumpitan, which is a Bamboo from 6 to 8 feet long, the arrows are slips of Bamboo 10 inches long, with a piece of light wood at the bottom, shaped to the bore of the tube, which they propel by blowing hard. The point of the arrow being anointed with a prepared poison called Tlipoh, communicates it to the blood and after two or three minutes the animal vomits and falls dead. Should the arrow penetrate the skin of large animals, many of them die, but they are generally lost to the sportsman, as they are able to run, (after having been wounded) to a great distance. These savages seldom miss their aim. I have seen them thus shoot with their arrows monkeys seated on trees of seventy or eighty feet high, when the wounded animal, after jumping on some other branches, and throwing away what he was eating, immediately after fell down, if the Tlipoh had been well prepared.—*Jour. Ind. Arch. Vol. V. No. 8, August 1851.*

(1168) MISWAK, HIND. A twig of a tree used as a tooth brush.

(1169) MOAR, a river of Malacca, which rises in the mountains of Pahang.

(1170) MOHURRUM. This is the first month of the Mohomedan year: the first ten

## MOLLUSCA.

days of this month are held as a festival, which is celebrated as Christmas is, sometimes by strict religious rites or by great festivity according to the opinions or ignorance of the sects. The Shiah Mahomedans and learned Mahomedans generally are most strict in the observance of their religious duties for the first thirteen days of this month.

(1171) MOLUCCAS. The Moluccas exhibit a very singular feature in the exact conical form, with which most of them rise above the horizon to meet the navigator at the distance of 80 or 90 miles. In other cases he is glad to have the flying contour of a landscape to guide him in the recognition of the coast and headlands, but there is something so peculiar in the aspect of these islands, that he feels confident he never can mistake them. The extirpation by the Dutch of the spice trees in the Moluccas is no longer prosecuted, although its effects are of course still felt. The monopoly of the spices is continued, but the system now pursued is not so oppressive to the natives.—*Jour. Ind. Arch. Vol. VI, No. X.*

(1172) MOLLUSCA. Conchology is that branch of science which teaches the structure and forms of the shells which are the hard external covering of the animals belonging to the class *Mollusca*. Although these shells present great variety of forms, and are variously marked, they are only a subsidiary part of the structure of the animals to which they belong. Hence amongst naturalists the shells are only studied in connection with the structure of the animals which inhabit them. The Mollusca are arranged into Divisions, Classes, Orders, Families, Genera and sub-Genera, the two great divisions, the Encephala and Acephala, being sub-divided into 6 classes as follows:

Encephala.	Acephala.
1. Cephalopoda.	4. Brachiopoda.
2. Gasteropoda.	5. Conchifera.
3. Pteropoda.	6. Tunicata.

Amongst the various paths which the researches of naturalists incline them to pursue, there are few which have been more frequently entered on than the Mollusca of these countries. But in their treatment of them naturalists have hitherto only described the shells of particular localities, and this article may be regarded as the result of the first attempt which has been made to bring together from every known available source the names of the genera and species of the mollusca of Eastern and Southern Asia. The classification followed is that of Mr. Woodward in his invaluable work on Recent and Fossil shells, and the sources of information have been the Journal of the Asiatic Society of Bengal: the Journal of the Archipelago; the Catalogue of the Government Central Museum, Madras; the Catalogue of the British Museum and tabular classification of

# MOLLUSCA.

the Mollusca arranged by the Editor from Mr. Woodward's work and printed in 1854. The results here given will comprise the Genera known to inhabit the regions to the natural and manufactured products of which our labours relate, stating the number of species in the world belonging to each genus and describing, as many of the species as we have found described. Doubtless, this first attempt will be imperfect, but its improvement will be easy in the future.

## CLASS I.

### CEPHALOPODA. CEPHALOPODS.

#### Order I. Dibranchiata. Section. A. Octopoda. Family I. Argonautidæ.

Genus. Argonauta, Argonaut or paper sailor ; recent 4 sp., fossil, 1 sp. *Syn.* Ocythoe. Nautilus  
Argonauta argo. Singapore,  
Argonauta tuberculata. Amboyna.  
Argonauta hians. China.  
Argonauta gondola. Mozambique.  
Argonauta thaustum. East Indies.  
Argonauta vitrea. Amboyna.  
Argonauta cymbium. Amboyna.  
Argonauta cornu. Cape of Good Hope.

#### Family II. Octopodidæ.

Genus. Octopus *Syn.* cistopus.

#### Section B. Decapoda. Family III. Teuthidæ.—

Calamaries, or Squids, Sub-Family A. Myopsidæ. *Eyes* covered by the skin.

Genera. Loligo. Calamary, *rec.* 21. *Syn.* teuthis.

Sepioteuthis *rec.* 13 sp.

Sepioida. *rec.* 6 sp.

Sub-Family B. Oigopsidæ. *Eyes* naked.

Onychoteuthis dussumieri. Mauritius

Onychoteuthis, Uncinated calamary. recent 6 species.

Enoploteuthis. Armed Calamary, *rec.* 10 sp.

*Syn.* ancistrochilus and abralia. octopodoteuthis.

Onmastrephe. Sagittated calamary, *rec.* 14 sp.

#### Family V. Sepiadæ.

Genus. Sepia. *rec.* 36 sp. *fossil*, 5 sp. *Syn.* belosepia.

Sepia. Indian Seas.

#### Family VI. Spirulidæ.

Genus, Spirula. *rec.* 3. sp.

Spirula Peronii, Indian Seas.

#### Order II. Tetrabranchiata. Family I. Nautilidæ.

Genera. Nautilus. *rec.* 2 or 4 sp. *fossil*, 100 sp.

Nautilus pompilius. Indian Archipelago.

Amboyna.

Nautilus rugosus. Southern Ocean.

Nautilus spengleri. Sands in India.

Nautilus anguiculatus. Sands in India.

Nautilus craticulatus. Arabian Shores.

Nautilus—striato punctatus. Arabian Shores.

Nautilus ambiguus. Arabian Shores.

Nautilus angulatus. Arabian Gulf.

Nautilus aduncus. Arabian Gulf.

# MOLLUSCA.

## CLASS II.

### GASTEROPODA. GASTEROPODS.

#### Order I. Prosobranchiata. Section A. Siphonostomata. Carnivorous Gasteropods. Family I. Strombidæ. Wing-Shells.

Genus Strombus Stromb *rec.* 60 sp. *fossil*, 5 sp.

Strombus Unicornis. East Indies.

Strombus Chiragra. China.

Strombus Scorpins. Amboyna.

Strombus Lambis. Batavia.

Strombus Bryonia. East Indies

Strombus Millepeda. Coromandel.

Strombus Papilio. East Indies.

Strombus Laciniatus. East Indies.

Strombus Marginatus. China.

Strombus Luhuamus. China.

Strombus Gibberulus. Amboyna.

Strombus urceus. Singapore.

Strombus urceus, variety, Indian Seas.

Strombus melanostoma. Indian Archipelago.

Strombus auris Dianæ. Sowerby. *Syn.* S. Guttata, Reeve. Indian Archipelago.

Strombus floridus Reeve. S. mutabilis. Sowerby. Seychelle Islands.

Strombus tricornis. Red Sea.

Strombus, probably young of, S. tricornis. Sowerby. Red Sea.

Strombus succinctus. Indian Seas.

Strombus marginatus. Indian Seas.

Strombus dentatus. Reeve. Indian Seas.

Strombus mauritanus, Ceylon.

Strombus cylindricus. Indian Seas.

Strombus lentiginosus. Indian Seas.

Strombus canarium. Ceylon, Amboyna.

Strombus canarium, variety. Labuan.

Strombus Isabella. Singapore.

Strombus latissimus. China.

Strombus cancellatus. Ceylon.

Strombus luhuamus. Ceylon.

Strombus labiosus. Ceylon.

Strombus incisus. Ceylon.

Strombus Accipiter. Asiatic Ocean,

Strombus epidromis. Amboyna.

Strombus minimus. Amboyna.

Strombus vittatus. Amboyna.

Strombus sulcatus. China.

Strombus succinctus. Amboyna.

Strombus fissurella. East Indies.

Strombus tridentatus. Amboyna.

Strombus vexillum. East Indies.

Strombus pulistris. East Indies.

Strombus ater. Marshes in Amboyna.

Strombus jugosus. Indian Ocean.

Strombus floridus. Indian Ocean.

Strombus petrosus. East Indies.

Strombus persicus. Persian Gulf.

Pteroceras Scorpion-shell, *rec.* 10 sp. *fossil*, 100 sp.



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<i>Pteroceras chiragra</i> ,	Singapore, Ceylon.
<i>Pteroceras lambis</i> ,	Singapore.
<i>Pteroceras</i> , Scorpion-shell.	
<i>Pteroceras species</i> .	Ceylon.
<i>Pteroceras scorio</i> .	Indian Seas.
<i>Pteroceras aurantia</i> .	Ceylon.
<i>Pteroceras lambis</i> .	Indian Seas.

*Rostellaria*. *Syn. fusus*, *rec* 5 sp. *fossil*, 70 sp.  
*Rostellaria cancellata*. Kiener. — N. B. Generic  
and specific name of this shell much disputed.  
*Ceylon*.

*Rostellaria rectirostris*. Labuan.

Seraphs. (Terebellum), *rec*. 1 sp. *fossil*, 5 sp.

Seraphs. Woodward, (Terebellum), *sabulatum*.  
Lamarck. *Ceylon*. &c.

## Family II. Muricidæ.

Genera, *Murex*, *rec*. 180 sp. *fossil*, 160 sp.

<i>Murex haustellum</i> ,	Amboyna.
<i>Murex notacilla</i> .	East Indies.
<i>Murex tribulus</i> .	Amboyna.
<i>Murex cornutus</i> .	Amboyna.
<i>Murex miliaris</i> .	Nicobar Islands.
<i>Murex melanamathos</i> .	East Indian Seas
<i>Murex tripterus</i> .	Batavia.
<i>Murex triqueter</i> .	China.
<i>Murex scorio</i> .	Amboyna.
<i>Murex saxatilis</i> .	Amboyna.
<i>Murex sacellum</i> .	Nicobar Islands.
<i>Murex rana</i> .	Amboyna.
<i>Murex spinosus</i> .	Tranquebar.
<i>Murex bufonius</i> .	South Seas.
<i>Murex argus</i>	Amboyna.
<i>Murex femorale</i> .	Ceylon.
<i>Murex lotorium</i> .	Amboyna.
<i>Murex maculosus</i> .	Amboyna.
<i>Murex pyrum</i> .	Coromandel.
<i>Murex clavator</i> .	Ceylon.
<i>Murex caudatus</i> .	Coromandel.
<i>Murex anus</i> .	Amboyna.
<i>Murex neritoideus</i> .	Coromandel.
<i>Murex hystrix</i> .	East Indies.
<i>Murex ricinus</i> .	China.
<i>Murex mancinella</i> .	Amboyna.
<i>Murex hippocastanum</i> .	Batavia.
<i>Murex plicatus</i> .	East Indies.
<i>Murex senticosus</i> .	Amboyna.
<i>Murex melongena</i> .	Amboyna.
<i>Murex calcaratus</i> .	Amboyna.
<i>Murex consul</i> .	East Indies.
<i>Murex Babylonius</i> .	Amboyna.
<i>Murex javanus</i> .	Java.
<i>Murex tornatus</i> .	Tranquebar.
<i>Murex colus</i> .	Amboyna.
<i>Murex colosseus</i> .	Amboyna.
<i>Murex longicaudus</i>	Amboyna.
<i>Murex lancea</i> .	Amboyna.
<i>Murex versicolor</i> .	East Indies.
<i>Murex cochilidium</i> .	East Indies.
<i>Murex tuba</i> .	China.
<i>Murex spirillum</i> .	Malabar.
<i>Murex aruanus</i> .	China.
<i>Murex tritonis</i> .	Amboyna.

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<i>Murex scala</i> .	East Indies.
<i>Murex fucellum</i> ,	Pulo Condore.
<i>Murex undatus</i> .	Tranquebar.
<i>Murex virgatus</i>	East Indies.
<i>Murex trapezium</i> .	Amboyna.
<i>Murex vespertilio</i> .	Tranquebar.
<i>Murex ternatanus</i> .	Isle of Ternate.
<i>Murex perron</i> .	South Seas.
<i>Murex prismaticus</i> .	Friendly Islands.
<i>Murex arenosus</i> .	India.
<i>Murex vertagus</i> .	Amboyna.
<i>Murex curvirostris</i> .	Amboyna.
<i>Murex plicatulus</i> .	Amboyna.
<i>Murex aluco</i> .	Amboyna.
<i>Murex nodulosus</i> .	Amboyna.
<i>Murex clava</i>	Pulo Condore.
<i>Murex torulosus</i> .	East Indies.
<i>Murex marginatus</i> .	East Indies.
<i>Murex serratus</i> .	Friendly Islands
<i>Murex tenuispina</i> .	Trincomallee, Ceylon.
<i>Murex nigripina</i> , young.	Singapore.
<i>Murex anguliferus</i> .	Ceylon.
<i>Murex pinnatus</i> .	China.
<i>Murex granulatus</i> .	Asiatic Ocean.
<i>Murex Moluccanus</i> .	Malacca.
<i>Murex hexagonus</i> .	South seas.
<i>Murex regius</i> .	South seas.
<i>Murex saxatilis</i> .	Singapore.
<i>Murex crassispina</i> .	Singapore.
<i>Murex adustus</i> and three others in	Singapore.
<i>Pisania</i> , <i>rec</i> . 120 sp. also <i>fossil</i> , ? sp.	
<i>Ranella</i> . Frog-shell, <i>rec</i> . 50 sp. <i>fossil</i> , 23 sp.	
<i>Ranella spinosa</i> and two others.	Singapore.
<i>Ranella</i> .	Aden.
<i>Triton</i> , <i>rec</i> . 100 sp. <i>fossil</i> , sp. 45.	
<i>Fasciolaria</i> , <i>rec</i> , 16 sp. <i>fossil</i> . 28 sp.	
<i>Triton clandestinus</i> .	Ceylon.
<i>Turbinella</i> , <i>rec</i> . 70 sp. <i>fossil</i> , 20 sp.	
<i>Sub-genera</i> . <i>Cynodonta</i> .	
	<i>Latirus</i> .
	<i>Lagena</i> .
<i>Cancellaria</i> , <i>rec</i> . 70 sp. <i>fossil</i> , 60 sp.	
<i>Pyrula</i> . Fig-shell, <i>rec</i> . 39 sp. <i>fossil</i> , 30 sp.	
<i>Pyrula vespertilio</i> . Lamarck. <i>Pugilimus</i> . Born.	
<i>Pyrula rapa</i> .	Singapore.
<i>Pyrula ficus</i> .	Singapore.
<i>Pyrula elongata</i> and four others.	Singapore.
<i>Sub-genera</i> . <i>Fulgur</i> .	
	<i>Myristica</i> .
<i>Fusus</i> . Spindle-shell, <i>rec</i> . 100 sp. <i>fossil</i> , 320 sp.	
<i>Fusus</i> . From <i>Red Sea</i> .	
<i>Sub-genus</i> . <i>Pusionella</i> , <i>rec</i> . 7 sp. also <i>fossil</i> .	
Family III. <i>Buccinidæ</i> .	
Genera. <i>Buccinum</i> . Whelk, <i>rec</i> . 20 sp. <i>fossil</i> , 130 sp.	
<i>Buccinum Olearium</i> .	East Indies.
<i>Buccinum Pomum</i> .	Amboyna.
<i>Buccinum sulcosum</i> .	Coromandel.

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Buccinum Dolium.	Amboyna.
Buccinum Chinense.	China.
Buccinum abbreviatum.	Indian Ocean.
Buccinum cornuton.	Amboyna.
Buccinum Areola.	Amboyna.
Buccinum strigutum.	Indian Seas.
Buccinum inflatum.	Indian Seas.
Buccinum tessellatum.	Amboyna.
Buccinum cicatricosum.	Indian Ocean.
Buccinum erinaceus.	Amboyna.
Buccinum fimbria.	East Indies.
Buccinum glaucum.	Amboyna.
Buccinum vibex.	Amboyna.
Buccinum papillosum.	Java.
Buccinum glans.	Asiatic Ocean.
Buccinum foliosum.	Amboyna.
Buccinum arcularia.	China.
Buccinum pullus.	Straits of Malacca.
Buccinum thersites.	Asiatic Ocean.
Buccinum verrucosum.	East Indies.
Buccinum harpa.	East Indies.
Buccinum cancellatum.	Tranquebar.
Buccinum costatum.	Philippines.
Buccinum persicum.	Persian Gulf.
Buccinum armigerum.	South Seas.
Buccinum luteostomum.	China.
Buccinum sulcatum.	Tranquebar.
Buccinum sertum.	Tranquebar.
Buccinum rusticum.	Tranquebar.
Buccinum tuba.	Indian Ocean.
Buccinum scala.	East Indies.
Buccinum spiratum.	East Indies.
Buccinum zeylanicum.	Ceylon.
Buccinum glabratum.	Tranquebar.
Buccinum cataracta.	Cape of Good Hope.
Buccinum lævissimum.	Indian Seas.
Buccinum læve.	East Indies.
Buccinum ocellatum.	East Indies.
Buccinum cochlidium.	Island in the South Seas.
Buccinum undosum.	Amboyna.
Buccinum affine.	South Seas.
Buccinum indicum.	East Indies.
Buccinum tranquebari- cum.	Coromandel.
Buccinum versicolor.	East Indies.
Buccinum bezoar.	China.
Buccinum bulbosum.	Tranquebar.
Buccinum clathratum.	East Indies.
Buccinum niveum.	Tranquebar.
Buccinum lima.	East Indies.
Buccinum stolatum.	Tranquebar.
Buccinum plicatulum.	China.
Buccinum piscatorium.	Ceylon.
Buccinum maculatum.	Coromandel.
Buccinum oculatum.	Asiatic Ocean.
Buccinum subulatum.	Indian Ocean.
Buccinum crenulatum.	Amboyna.
Buccinum vittatum.	East Indies.
Buccinum digitale.	Amboyna.
Buccinum strigillatum.	China.
Buccinum duplicatum.	East Indies.
Buccinum cinereum.	East Indies.

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Buccinum succinctum.	India.
Buccinum lanceatum.	East Indies.
Buccinum dimidiatum.	East Indies.
Buccinum phallus.	Asia and Africa.
Buccinum bifasciatum.	East Indies.
Buccinum relongatum.	Amboyna.
Anolax, rec. 25 sp. fossil 3 sp.	
Bullia vittata;	Trincomallee Ceylon.
Anolax or Bullia.	Madras.
Terebra. Auger-shell, rec. 109 sp. fossil, 24 sp.	
Terebra maculata.	Singapore.
Terebra strigilla another.	Singapore.
Eburna. Ivory-shell rec. 9 sp.	
Eburna spirata.	Madras.
Nassa. Dog-whelk, rec. 68 sp. fossil, 19 sp.	
Nassa	Labuan
Nassa clathrata.	Labuan.
Nassa.	Labuan.

A variable tendency does not prevail in all shells though some kinds are very liable to it, particularly the genus *Nassa*. In illustration of this property of change, Dr. Traill describes a species of *Nassa* found in the mud of salt swamps in Singapore, it is in colour a dark brown or black, about an inch and a half in length, the outer whorl is smooth, those next the apex of the spire are furrowed longitudinally, and it possesses the usual generic mark of a prominent plait at the upper part of the aperture. Out of many specimens examined, he observed none to deviate from the above description. In the same localities may be found another shell quite similar to the other in form and colour, but not more than half its length, possessing however all the marks of a full grown shell, and as no shells of intermediate size are to be met with, there seems good reason to believe them two distinct species. The following instance is however more remarkable in connexion with the above. He found at Malacca a species of *Nassa* of a pale flesh colour, barred with brown, about a third of an inch in length, and little more than a grain in weight. In the same neighbourhood he met with another specimen, three quarters of an inch in length, and weighing between four and five grains. As in the former case, the two shells were exactly similar in shape and colour, though very different in size and weight, and as both had the marks of having attained their full size, he was ready to believe that he had obtained two new species; a further search however, put him in possession of fifteen additional specimens, similarly marked but all of them intermediate to the two first in size and weight; in fact the whole seventeen formed an almost imperceptible scale of gradation, sufficiently proving that they were so many varieties of one and the same species. He observed several kinds of *Nassa* particularly abundant in the neighbourhood of the Fish Markets, where they may be seen in numbers feeding on dead fish and other animal food. This artificial mode of subsistence is possibly one cause of their



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variable form and size as it is well known that domestic animals, and others that are more or less dependent on man for their support, are very apt to produce a progeny differing more or less from the parent stock. A good example of the propagation of an accidental variety, is familiar in the instance of a well known domestic animal of the feline genus, which in Singapore is rarely seen with a perfect tail. In the neighbourhood of Fish Markets may also be seen multitudes of dead shells of all sizes some so minute as to be microscopic, and all tenanted by the Paguri or Hermit crabs, as varied in size as the shells they inhabit, and like the Nassa, busily engaged in devouring fragments of dead fish, which is their principal food. The mention of them here is a parallel instance of the effect of artificial life upon some of the lower animals, for these crabs are not, as might be supposed, one, or at most, two or three, species in different stages of growth. If an examination be made, it will be found that individuals of all sizes are laden with spawn, not excepting such as are so minute that their forms are not to be distinguished by the naked eye: it cannot be imagined that each of these is a different species, they are in fact an evident instance of the alteration of a species into an almost infinite number of varieties.

Phos. *rec.* 30 sp.

? Ringicula *rec.* 4 sp. *fossil*, 9 sp.

Purpura Purple, *rec.* 140 sp. *fossil*. 30 sp.

Purpura persica. Moulmein.

Purpura armigera. Singapore.

Cuma,

Rapana.

Pedicularia. *rec.* 1 sp.

Ricinula *rec.* 25 sp. *fossil*, 3 sp.

Planaxis. *rec.* 11 sp. also *fossil*.

Planaxis sulcatus Ceylon.

*Magilus antiquus* has lately been found north of Penang in the neighbourhood of Junk Ceylon, the natives set some value on them, and occasionally wear them as ornaments; the shell is singular and apt to be mistaken for a petrification, being dense in structure, diaphanous and much like alabaster. It has been often figured and described by naturalists, but the animal inhabiting it is, Dr. Traill believes, unknown, unless described in some very recent publications: it is supposed to be a Gasteropod, though this is rather doubtful, as the shell is said to be generally found imbedded in coral or madrepora: It is probable that this point might be satisfactorily settled by a careful examination of the above locality.

Cassis. Helmet-shell, *rec.* 34 sp. *fossil*, 36 sp.

Cassis species Singapore.

C. glauca. Singapore.

Cassis decussatus. Singapore.

Oniscia. *rec.* 6 sp. *fossil*, 3 sp.

Cassidaria. *rec.* 5 sp. *fossil*, 10 sp.

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Dolium. The tun, *rec.* 14 sp. *fossil*, 7 sp.

Harpa. Harp-shell, *rec.* 9 sp. *fossil*, 4 sp.

Columbella. *rec.* 202 sp. *fossil*, 8 sp.

Columbella pardalina. Labuan.

Columbella. Labuan.

Columbella terpsichore. Ceylon.

Collumbella rustica. Singapore.

Collumbella fulgurans.

Collumbella mercatoria.

Collumbella hebraea and three others.

Sub-genus. Columbellina. *rec.*? and *fossil*. 4 sp.

Oliva. Olive. rice-shell, *rec.* 117 sp. *fossil*, 20 sp.

Oliva utriculus. Ceylon.

Oliva utriculus, variety. Labuan.

Oliva maura. Labuan.

Sub-genera. Olivella. *recent*.

Scaphula. *recent*.

Scaphula pinna. B. Tenasserim River.

Ancillaria. *rec.* 23 sp. *fossil*, 21 sp.

### Family IV. Conidae. Cones.

Genera. Conus. Cone-shell, *rec.* 269 sp. *fossil*, 80 sp.

Conus marmoreus. East and West Indies.

Conus nicobaricus. East Indies.

Conus arachnoideus, Tranquebar.

Conus zonatus. Asiatic Ocean.

Conus imperialis. Amboyna.

Conus literatus. Amboyna.

Conus eburneus. East Indies.

Conus generalis. Amboyna.

Conus canaliculatus. Ceylon.

Conus capitaneus. Amboyna.

Conus chemnitzii. Ceylon.

Conus mustelinus. Batavia.

Conus miles. Amboyna.

Conus leoninus. Amboyna.

Conus princeps. Asiatic Ocean.

Conus janus. Asiatic Ocean.

Conus lorenzianus. East Indies.

Conus amadis. Java

Conus acuminatus. Amboyna.

Conus thomæ. Asiatic Ocean.

Conus ammarilis. Amboyna.

Conus archithalassus. Amboyna.

Conus aurantius. Philippine Islands.

Conus catus. Cape of Good Hope.

Conus nobilis. Amboyna.

Conus siamensis. China.

Conus gennanus. East Indies.

Conus prometheus. Java.

Conus musicus. China.

Conus miliaris. China.

Conus glaucus. Amboyna.

Conus suratensis. East Indies.

Conus monachus. China.

Conus achatinus. Batavia.

Conus luzonicus. Philippine Islands.

Conus rusticus. Amboyna.

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<i>Conus nusus.</i>	East Indies
<i>Conus lividus.</i>	Cape of Good Hope.
<i>Conus distans.</i>	South Seas.
<i>Conus vittatus.</i>	Asiatic Ocean.
<i>Conus classarius.</i>	Asiatic Ocean
<i>Conus mercator.</i>	Cape of Good Hope.
<i>Conus betulinus.</i>	Amboyna.
<i>Conus figulinus.</i>	Malabar.
<i>Conus quercinus.</i>	Cape of Good Hope.
<i>Conus lineatus.</i>	Philippine Islands.
<i>Conus ermineus.</i>	East Indies.
<i>Conus vexillum.</i>	Batavia.
<i>Conus namocanus.</i>	South Sea.
<i>Conus costatus.</i>	South Sea and China.
<i>Conus ebraeus.</i>	East Indies.
<i>Conus stercus musca-</i>	
<i>rum.</i>	Amboyna.
<i>Conus arenatus.</i>	Batavia.
<i>Conus zeylanicus.</i>	Ceylon.
<i>Conus punctatus.</i>	East Indies.
<i>Conus cornatus.</i>	East Indies.
<i>Conus sponsalis.</i>	South Seas.
<i>Conus ceylonensis.</i>	Ceylon.
<i>Conus lamellosus.</i>	Ceylon.
<i>Conus Madurensis.</i>	Asiatic Ocean.
<i>Conus japonicus.</i>	Japan.
<i>Conus festius.</i>	Moluccas.
<i>Conus clarus.</i>	East Indies.
<i>Conus aureus.</i>	China.
<i>Conus affinis.</i>	East Indies.
<i>Conus strigatus.</i>	Indian Seas.
<i>Conus mitratus.</i>	Indian Seas.
<i>Conus tenellus.</i>	Moluccas.
<i>Conus aurisiacus.</i>	Amboyna.
<i>Conus Terebellum.</i>	Batavia.
<i>Conus Raphanus.</i>	Asiatic Ocean.
<i>Conus Augur.</i>	Ceylon.
<i>Conus Magus.</i>	Amboyna.
<i>Conus striatus.</i>	Moluccas.
<i>Conus Gubernator.</i>	Asiatic Ocean.
<i>Conus Gloria maris</i>	East Indian Ocean.
<i>Conus pyramidalis.</i>	Torrid zone.
<i>Conus Texile.</i>	East and West Indies.
<i>Conus Archiepiscopus.</i>	East Indies.
<i>Conus Canonicus.</i>	Indian Seas.
<i>Conus Episcopus.</i>	Indian Seas.
<i>Conus Praelatus.</i>	Indian Seas.
<i>Conus pennaceus.</i>	Amboyna.
<i>Conus rubiginosus.</i>	Amboyna.
<i>Conus aulicue.</i>	Amboyna.
<i>Conus spectrum.</i>	Amboyna.
<i>Conus bullater.</i>	Moluccas.
<i>Conus timorensis.</i>	East Indian Ocean.
<i>Conus nimbesus.</i>	East Indian Ocean.
<i>Conus rosaceus.</i>	East Indian Ocean.
<i>Conus geographus.</i>	Amboyna.
<i>Conus gratis.</i>	Timor.
<i>Conus lucidus.</i>	South Seas.
<i>Cithara</i> rec 50 sp.	
<i>Pleurotoma</i> rec. 430 sp. fossil, 300 sp.	
<i>Pleurotoma,</i>	Red Sea. •
<i>Pleurotoma nodifera.</i>	Singapore.

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## Family V. Volutidæ.

Genera <i>Voluta</i>	<i>Volute</i> rec. 70 sp. fossil, 80 sp.
<i>Voluta auris midae.</i>	East Indies.
<i>Voluta auris judæ.</i>	Malacca.
<i>Voluta auris virginis.</i>	East Indies.
<i>Voluta auris vulpina.</i>	St. Helena.
<i>Voluta solidula.</i>	China.
<i>Voluta flava.</i>	East Indies.
<i>Voluta erythrostoma.</i>	Amboyna.
<i>Voluta oliva.</i>	Amboyna.
<i>Voluta cruenta.</i>	Amboyna.
<i>Voluta ventricosa.</i>	Moluccas.
<i>Voluta incrassata.</i>	Moluccas.
<i>Voluta utriculus.</i>	Coromandel.
<i>Voluta ispidula.</i>	Moluccas.
<i>Voluta tigrina.</i>	Eastern Ocean.
<i>Voluta carneola.</i>	Moluccas.
<i>Voluta micans.</i>	Moluccas.
<i>Voluta nitidula.</i>	Moluccas.
<i>Voluta dactylus.</i>	India.
<i>Voluta fenestrata.</i>	India.
<i>Voluta crenulata.</i>	East Indies.
<i>Voluta monilis.</i>	China.
<i>Voluta porcellana.</i>	Indian Ocean.
<i>Voluta faba.</i>	Bombay.
<i>Voluta bullata.</i>	East Indies.
<i>Voluta patriarchalis.</i>	East Indies.
<i>Voluta microzonias.</i>	Indian Ocean.
<i>Voluta acuminata.</i>	Tranquebar.
<i>Voluta filosa.</i>	East Indies.
<i>Voluta Clathrus.</i>	China.
<i>Voluta crenifera.</i>	Indian Seas.
<i>Voluta scabricula.</i>	China.
<i>Voluta exasperata.</i>	East Indies.
<i>Voluta granosa.</i>	East Indian Ocean.
<i>Voluta ruffina.</i>	Eastern Ocean.
<i>Voluta sanguisuga.</i>	Amboyna.
<i>Voluta vulpecula.</i>	Amboyna.
<i>Voluta costellaris.</i>	Indian Ocean.
<i>Voluta subdivisa.</i>	Indian Ocean.
<i>Voluta melongena.</i>	Indian Ocean.
<i>Voluta polygona.</i>	Indian Ocean.
<i>Voluta tæniata.</i>	Bombay.
<i>Voluta plicaria.</i>	China.
<i>Voluta rugosa.</i>	Indian Ocean.
<i>Voluta cruentata.</i>	East Indies.
<i>Voluta spiralis.</i>	Indian Seas.
<i>Voluta vitulina.</i>	Indian Seas.
<i>Voluta scutata.</i>	Indian Seas.
<i>Voluta casta.</i>	Amboyna.
<i>Voluta sulcata.</i>	Tranquebar.
<i>Voluta abbatis.</i>	East Indies.
<i>Voluta serpentina.</i>	East Indies.
<i>Voluta pertusa.</i>	East Indies.
<i>Voluta digitalis.</i>	East Indies.
<i>Voluta episcopalis.</i>	Asiatic Ocean.
<i>Voluta papalis.</i>	Amboyna.
<i>Voluta plicata.</i>	East Indies.
<i>Voluta vexillum.</i>	Amboyna.
<i>Voluta imperialis.</i>	Straits of Malacca.
<i>Voluta turbinellus.</i>	Amboyna.
<i>Voluta capitellum.</i>	Indian Ocean.



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<i>Voluta ceramica.</i>	Moluccas.
<i>Voluta pyrum.</i>	Ceylon.
<i>Voluta gravis.</i>	Straits of Malacca.
<i>Voluta flavicans.</i>	East Indies.
<i>Voluta rupestris.</i>	Japan.
<i>Voluta scapha.</i>	Cape of Good Hope.
<i>Voluta æthiopica.</i>	Amboyna.
<i>Voluta corona.</i>	East Indies.
<i>Voluta cymbiola.</i>	East Indies.
<i>Voluta neptuni.</i>	Persian Gulf.
<i>Voluta præputum.</i>	Coromandel.
<i>Voluta indica.</i>	China.
<i>Voluta aulica.</i>	Indian Ocean.
<i>Voluta crassa.</i>	South Sea.
<i>Voluta punctata.</i>	South Sea.
<i>Voluta tuberculata.</i>	South Sea.
<i>Voluta dama.</i>	South Sea.
<i>Voluta undulata.</i>	Singapore.
<i>Voluta melo.</i>	Singapore.

*Melo. rec. 8 sp.*

*Mitra, Mitre-shell, rec. 350 sp. fossil, 90 sp.*

*Mitra corrugata.* Labuan.

*Mitra melongena.* Singapore

*Mitra Gruneri,* Labuan.

*Mitra vulpecula, variety.* Labuan.

*Mitra undescribed.* Singapore.

*Mitra amphorella.* Labuan.

*Marginella. rec. 90 sp fossil. 30 sp.*

### Family VI. Cypræidæ. Cowries.

Genera. *Cypræa.* Cowry, *rec. 150 sp. fossil,*  
78 sp.

<i>Cypræa mappa.</i>	Amboyna.
<i>Cypræa Histrio.</i>	Amboyna.
<i>Cypræa argus.</i>	Amboyna.
<i>Cypræa testudinaria.</i>	Ceylon.
<i>Cypræa carneola.</i>	Amboyna.
<i>Cypræa talpa.</i>	Asia.
<i>Cypræa undulata.</i>	Mauritius.
<i>Cypræa mauritiana.</i>	Mauritius, Amboyna.
<i>Cypræa vitellus.</i>	Amboyna.
<i>Cypræa mus.</i>	Amboyna.
<i>Cypræa Lynx.</i>	Mauritius.
<i>Cypræa felina.</i>	Maldives.
<i>Cypræa Isabella.</i>	Amboyna.
<i>Cypræa scurra.</i>	Eastern Ocean.
<i>Cypræa onyx.</i>	Asia.
<i>Cypræa zic-zac.</i>	East Indian Ocean.
<i>Cypræa hirundo.</i>	Maldives.
<i>Cypræa asellus.</i>	Amboyna.
<i>Cypræa erronea.</i>	East Indies.
<i>Cypræa cribaria.</i>	China.
<i>Cypræa moneta.</i>	East Indies.
<i>Cypræa annulus.</i>	Amboyna.
<i>Cypræa stolidia.</i>	Amboyna.
<i>Cypræa cruenta.</i>	Amboyna.
<i>Cypræa erosa.</i>	Mauritius.
<i>Cypræa rubiginosa.</i>	Eastern Ocean.
<i>Cypræa tabescens.</i>	Amboyna.
<i>Cypræa helvala.</i>	Amboyna.
<i>Cypræa ocellata.</i>	Indian Ocean.

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<i>Cypræa gangranosa.</i>	China.
<i>Cypræa pustulata.</i>	China.
<i>Cypræa staphylea.</i>	East Indies.
<i>Cypræa cicercula.</i>	Amboyna.
<i>Cypræa marginata.</i>	Amboyna.
<i>Cypræa globulus.</i>	Amboyna.
<i>Cypræa minuta.</i>	Amboyna.
<i>Cypræa tessellata.</i>	South Seas.
<i>Cypræa lactea.</i>	South Seas.
<i>Cypræa sulcidentata.</i>	South Seas.
<i>Cypræa listeri.</i>	South Seas.
<i>Cypræa arenosa.</i>	South Seas.
<i>Cypræa turdus.</i>	South Seas.
<i>Cypræa arabicula.</i>	South Seas.
<i>Cypræa commixta.</i>	Indian Ocean.
<i>Cypræa nivea.</i>	South Seas.
<i>Cypræa rosea.</i>	Indian Ocean.
<i>Cypræa clandestina.</i>	South Seas.
<i>Cypræa capensis.</i>	Cape of Good Hope.

(1173) *Cypræa tigris*, of the very numerous genus of "*Cypræa*," or the "Cowry" shell, the largest species found in Singapore is the "*Cypræa tigris*" which is prettily spotted with black, it is frequently made into snuff boxes in England, the animals of several have been described and figured by authors. The mantle is so large as to cover all the shell, on the back of which there is often a longitudinal line which marks where its two-folds meet: this membrane continually secretes an abundance of viscid fluid which lubricates the shell, and preserves the beautiful polish which has procured for them the name of porcelain shells.

(1174) *Cypræa olivacea* is the most abundant of the Singapore Cowries being found on most beaches under flat stones: it is of the size and much the colour of an olive except that the back is generally mottled with brown and the mouth somewhat yellow; a specimen which Dr. Traill, found with the young attached, was fixed in the usual manner, to the lower surface of a stone: on raising it there was found adhering to it, a flat circular membrane broader than the shell, transparent, and dotted with minute grey spots like grains of sand, on placing the substance in a glass of sea water, numbers of the grains dropped out of the membranaceous mass to the bottom of the glass and immediately assumed rapid and lively movements, some revolving in a rotatory manner, others alternately rising and sinking in the water or sporting over its surface. On a closer examination these grains were seen to be in reality shells, some hundreds in number, nearly transparent, having no perceptible columella and apparently consisting of a single coil or whorl, aperture round, breadth of the shell greater than the length, so that, when on a plain surface it rested on either end like a *Planorbis* or *Nautilus*, the animal effected these rapid movements by the alternate contraction and expansion of its foot which was broad and expand-

## MOLLUSCA.

ed and much larger than the shell, into which it seemed to have no power of withdrawing it.

(1175) *Cypræa*, species, another small Cowry is occasionally found on the Singapore coast, resembling in colour the *C. adusta*, but not more than half the size and less cylindrical in shape: Captain Congalton of the H. C. Steamer "Hooghly" sent one that was fished up in "ten fathom water near Sultan's Shoal to the westward of Singapore, that shell was partially imbedded in a species of sponge, on detaching it from which, Dr. Traill found the cavity of the spongy mass lined with the young fry of the *Cypræa*, differing however in several respects from that of the *C. olivacea*;—instead of being contained in one membranaceous envelope there were above two hundred transparent sacs not larger than grains of mustard seed and each containing about 30 shells so minute that they could not be distinguished without the aid of a microscope, at a moderate computation there could not have been less than six thousand young shells: the difference in size is remarkable as the *Cypræa olivacea* which had the largest offspring is a much smaller shell than the one Dr. Traill had under consideration: in this case he had not an opportunity of studying their habits, &c. as the animals were dead, having been many hours out of the water; when examined under a microscope the shape of the shell was found to resemble exactly that of the young *C. olivacea* above described,

<i>Cypræa cicerula</i> .	Singapore.
<i>Cypræa quadrimaculata</i> .	Singapore.
<i>Cypræa urcellus</i> .	Singapore.
<i>Cypræa annulus</i> .	Singapore.
<i>Cypræa erosus</i> .	Singapore.
<i>Cypræa zigzag</i> .	Singapore.
<i>Cypræa caput-serpentis</i> .	Singapore.
<i>Cypræa poraria</i> .	Singapore.
<i>Cypræa adusta</i> .	Singapore.
<i>Cypræa arabica</i> .	Singapore.
<i>Erato</i> . rec. 8 sp. fossil, 2 sp.	
<i>Ovulum</i> . rec. 36 sp. fossil, 11 sp.	
<i>Ovulum ovum</i> .	Ceylon.
<i>Ovulum verrucosum</i> .	Singapore.
<i>Ovulum triticeum</i> .	Singapore.

### Section B. Holosomata, sea-snails. Family I. Naticidæ.

Genera. <i>Natica</i> . rec. 90 sp. fossil, 260 sp.	
<i>Natica Chinensis</i> .	
<i>Natica lineata</i> .	Madras.
<i>Natica</i> .	Singapore.
<i>Natica mamillo</i> .	Singapore.
<i>Sigaretus</i> . rec. 26 sp. fossil, 10 sp.	
Sub-genus. <i>Naticina</i> . rec. and fossil.	
<i>Lamellaria</i> . rec. 5 sp. fossil, 2 sp.	
<i>Narica</i> rec. 6. sp. fossil, 4 sp.	

### Family II. Pyramidellidæ.

Genera. <i>Pyramidella</i> . rec. 11 sp. fossil, 12 sp.	
<i>Odostomia</i> . rec. ? sp. fossil, 15 sp. ?	
<i>Eulima</i> . rec. 15 sp. fossil, 40 sp.	

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Sub genus. *Niso*. rec. 5 sp. fossil, 3 sp.  
*Stylina*. rec. 6 sp.

### Family III. Cerithiadæ. Cerites.

Genera. <i>Cerithium</i> . rec. 100 sp. fossil, 460 sp.	
<i>Cerithium nodulosum</i> ,	from Red Sea.
<i>Cerithium obeliscus</i> .	Singapore.
<i>Cerithium obeliscus</i> ,	
variety.	Labuan.
<i>Cerithium morus</i> .	Bay of Bengal.
<i>Cerithium ambiguum</i> .	Ceylon.
<i>Cerithium petrosum</i> .	Singapore.
<i>Cerithium asperum</i> .	Singapore.
<i>Cerithium zonale</i> .	Singapore.
<i>Cerithium aluco</i> .	Singapore.
<i>Cerithium vertagus</i> .	Singapore.
<i>Cerithium telescopium</i>	Singapore.
<i>Cerithium palustre</i> .	Singapore.
<i>Cerithium obtusum</i> .	Singapore.
<i>Cerithium nodulosum</i> .	Singapore.
<i>Cerithidea obtusa</i> .	Singapore.

Sub Genus *Potamides*. *Cerithium microptera*.  
*Madras*.

Sub Genus *Potamides*. *Cerithium palustre*.  
*Trincomallee, Ceylon*.

*Potamides*. Fresh-water *Cerites*. rec. and fossil.

Sub-Genera. *Cerithidea*. rec.  
*Terebralia*. (*Cerith*, *Telescopium*),  
rec. *Calcutta*.  
*Pyræzus*. rec.  
*Lampania*. rec.

*Struthiolaria*. rec. 5 sp.

### Family IV. Melaniadæ.

Genera. <i>Melania</i> . rec. 160 sp. fossil, 25 sp.	
Sub-Genera. <i>Melanatria</i> . rec. and fossil.	
<i>Vibex</i> . rec.	
<i>Ceriphasia</i> . rec.	
<i>Hemisinus</i> . rec.	
<i>Melafusus</i> . rec.	
<i>Melatoma</i> . rec.	
<i>Anculotus</i> .	
<i>Amnicola</i> .	
? <i>Chilostoma</i> . fossil.	

<i>Paludomus</i> . rec. 10 sp.	
<i>Melania</i> .	Ceylon.
<i>Melania</i> .	Irawadi.
<i>Melania tuberculata</i> .	Calcutta.
<i>Melania Gardnerii</i> .	Ceylon.
<i>Melania variabilis</i> .	Calcutta.
<i>Melania</i> .	Tenasserim.
<i>Melania lyrata</i> .	Calcutta.
<i>Melania spinulosa</i> .	Calcutta.
<i>Melania spinulosa</i> , vare	Calcutta.
<i>Melania spinulosa</i> young	Calcutta.
<i>Melania</i>	Madras.
<i>Melania</i> .	Calcutta.
<i>Melania flammigera</i> .	Labuan.
<i>Melania</i> .	Ceylon.
<i>Paludomus</i> rec 10 sp.	
<i>Paludomus oricatus</i> .	Calcutta.



## MOLLUSCA.

Paludomus.	Sylhet.
Paludomus conicus.	Sylhet.
Paludomus funiculatus.	Calcutta.
Paludomus.	Calcutta.
Paludomus.	Calcutta.
Paludomus.	Island of Bombay.
Paludomus.	India.
Paludomus.	India.
Paludomus labiosa. B.	Tavoy Province.
Paludomus stephanus	Teria.
Melanopsis <i>rec</i> 20 sp <i>fossil</i> , 25 sp.	
<i>Sub-genus</i> . Pirena <i>rec</i> 4 sp.	
Pirena terebralis, Lam.	Ceylon.
Pirena terebralis, Lam.	Calcutta.

### Family V. Turritellidæ.

Genera. Turritella <i>rec</i> . 50 <i>fossil</i> , 170 sp.	
Turritella.	Sadras.
Turritella terebra.	Singapore.
Vermetus. Worm-shell, <i>rec</i> also <i>fossil</i> , 12 sp.	
Siliquaria <i>rec</i> . 7 sp.	
Siliquaria anguina.	Singapore.
Scalaria Wentle-trap <i>rec</i> . 100 sp. <i>fossil</i> , 10. sp.	
Scalaria lamellosa.	Singapore.
Scalaria varicosa.	"
Scalaria coronata.	"

### Family VI. Litorinidæ.

Genera. Litorina Periwinkle, <i>rec</i> 40 sp. <i>fossil</i> , 10 sp.	
Littorina lævis.	Calcutta.
Littorina palleata.	Ceylon.
Littorina zig-zag.	Ceylon.
Littorina malaccana.	Ceylon.
Littorina trochiformis.	Ceylon.
<i>Sub-genera</i> . Tectaria <i>rec</i>	
Modulus <i>rec</i> .	
Risella <i>rec</i> .	
Solarium. Stair-case shell, <i>rec</i> . 25 sp. <i>fossil</i> , 56 sp.	
Phorus. Carrier-shell, <i>rec</i> 9 sp. <i>fossil</i> , 15 sp.	
Rissoa. <i>rec</i> . 70 sp. <i>fossil</i> , 100 sp.	
Syncera, <i>rec</i> .	
Assiminea sulcata. Banks of Hooghly, towards Sea.	
Assiminea. species.	Singapore.
Nematura deliæ.	Calcutta.
Truncatella species. •	Malacca.
Truncatella species.	Calcutta.
Truncatella species.	Ceylon.
Truncatella species.	Ceylon.
Truncatella species.	Ceylon.
Truncatella. Looping-snail, <i>rec</i> . 15 sp.	

### Family VII. Paludinidæ.

Genera. Paludina River-snail, <i>rec</i> . 60 sp. <i>fossil</i> , 50 sp.	
Paludina Bengalensis.	Calcutta. Madras.
Paludina Bengalensis.	
variety.	Tenasserim.
Paludina melanostoma.	Calcutta. Madras.
Paludina præmorsa.	
variety.	Tenasserim.
Paludina.	• Calcutta. Benares.

## MOLLUSCA.

Bithinia pulchella.	Calcutta.
Bithinia.	Island of Bombay.
Bithinia.	Sind.
Bithinia ceramcopoma.	
B.	Benares.
Ampullaria. Apple-snail, or idol-shell, <i>rec</i> . 50 sp.	
Ampullaria.	Malacca.
Ampullaria (glauca) ?	Ceylon.
Ampullaria.	Island of Bombay.
Ampullaria globosa,	Sylhet.
Amphibola.	Rec 3 sp.
Valvata marginalis.	Ceylon.

### Family VIII. Neritidæ.

Genera. Nerita. Nerite, <i>rec</i> . 116 sp. <i>fossil</i> , 60 sp.	
Nerita candida.	Moluccas.
Nerita vitellus.	Amboyna.
Nerita spadicea.	Mauritius.
Nerita pulmonea.	Moluccas.
Nerita orientalis.	East Indies.
Nerita cruentata.	Tranquebar.
Nerita albumen.	Amboyna.
Nerita papilla.	Tranquebar.
Nerita corona.	Ganges and China Fresh water.
Nerita radula.	Amboyna.
Nerita pulligera.	India Fresh water.
Nerita aculeata.	India Fresh water.
Nerita flavescens.	Nicobar Islands.
Nerita polita.	Amboyna.
Nerita litterata.	East Indies.
Nerita piperina.	Maabar.
Nerita larva.	Amboyna.
Nerita albicella.	Cape of Good Hope.
Nerita textilis.	Tranquebar.
Nerita histrio.	East Indies.
Nerita plicata.	Tranquebar.
Nerita lineata.	Straits of Malacca.
Nerita pica.	Amboyna.
Nerita costata.	Nicobar Islands.
Nerita grossa.	Asiatic Ocean.
Nerita chamæleon.	Moluccus.
Nerita stella.	East Indies.
Nerita undata.	East Indies.
Nerita undulata.	East Indies.
Nerita malaccensis.	Straits of Malacca.
Nerita semiconica.	India.
Nerita canalis.	South Sea Islands.
Nerita peloronta.	Singapore.
Nerita polita.	Singapore.
Nerita versicolor.	Singapore.
Nerita albicilla.	Singapore.
Nerita chlorostoma	Singapore.
Nerita atrata.	Singapore.
Neritina Fresh-water nerite, <i>rec</i> . 76. sp. <i>fossil</i> , 20 sp.	
Neritina brevispinosa.	Palawan.
Neritina strigillata.	Labuan.
Neritina auricularia.	Calcutta.
Neritina retifera.	Calcutta.
Neritina depressa.	Calcutta, Singapore.
Neritina dubia. Lamarek	Ceylon.

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Neritina pupa.	Jamaica.
Neritina virginea.	Ceylon.
Neritina species.	Madras.
Neritina tigrinae, Bnson,	Calcutta.
Neritina fuliginosa, Theo-	
bald.	Ava.
Neritina cryptospira. B.	Salwen river.
Navicella rec. 18 sp.	
Navicella. tessellata.	Calcutta.

### Family IX. Turbinidæ.

Genera. Turbo. Topshell, *rec.* 60 sp. *fossil*, 360 sp.

Turbo species.	Red Sea.
Turbo Nicobaricus.	Nicobar Islands.
Turbo nigerrimus.	South Sea.
Turbo pertholatus.	Amboyna.
Turbo cidaris.	China.
Turbo cochlus.	East Indies.
Turbo chrysostomus.	Amboyna.
Turbo tretum persicum.	Asiatic Ocean.
Turbo trochiformis.	Southern Ocean.
Turbo pagodus.	Amboyna.
Turbo calcar.	Amboyna.
Turbo stellaris.	South Seas.
Turbo aculeatus.	Nicobar Islands.
Turbo marmoratus.	Asiatic Ocean.
Turbo sarmaticus.	Moluccas.
Turbo olearius.	Coromandel.
Turbo cornutus.	China.
Turbo imperialis.	China.
Turbo coronatus.	Moluccas.
Turbo canaliculatus.	Moluccas.
Turbo sparverius.	East Indies.
Turbo spenglerianus.	East Indies.
Turbo atratus.	Nicobar Islands.
Turbo anguis.	South Seas.
Turbo argyrostomus.	Indian Seas.
Turbo Mespilus.	South Seas.
Turbo granulatus.	South Seas.
Turbo Delphinus.	Amboyna.
Turbo nodulosus.	East Indies.
Turbo scularis.	Amboyna.
Turbo principalis.	Coromandel.
Turbo sulcatus.	Ceylon.
Turbo limbatus.	Coromandel.
Turbo separatista.	Indian seas
Turbo niveus.	Nicobar Islands.
Turbo replicatus.	Tranquebar.
Turbo acutangulus.	Tranquebar.
Turbo Archimedis.	China.
Turbo Terebellum.	Nicobar Islands.
Turbo Turris Thomæ.	Island of St. Thomas.
Turbo ludus.	South seas.
Phasianella. Pheasant-shell	<i>rec.</i> 25 sp. <i>fossil</i> , 70 sp.
Imperator. <i>rec.</i> 20 sp. ?	
Trochus. <i>rec.</i> 150 sp. <i>fossil</i> , 360 sp.	
Trochus young from	Red Sea.
Trochus punctulatus.	New Zealand.
Trochus.	Malacca.
Trochus.	Aden.

## MOLLUSCA.

Trochus species.	Red Sea.
Trochus stellaris.	Malacca.
Trochus maculatus.	Aden.
Trochus.	Aden.
Trochus niloticus.	Amboyna.
Trochus conus.	East Indies.
Trochus concavus.	Coromandel.
Trochus vernus.	East Indian Seas.
Trochus conspersus.	East Indian Seas.
Trochus tentorum.	East Indian Seas.
Trochus ochroleucus.	East Indian Seas.
Trochus inæqualis.	Mozambique.
Trochus verrucosus.	East Indian Seas.
Trochus rusticus.	China.
Trochus nigerrimus.	China.
Trochus capensis.	Cape of Good Hope.
Trochus roseus.	Cape of Good Hope.
Trochus perspectivus.	Amboyna.
Trochus stramineus.	Tranquebar.
Trochus solaris.	East Indies.
Trochus labro.	Amboyna.
Trochus sinensis.	China.
Trochus melanostomus.	Southern Ocean.
Trochus fenestratus.	Amboyna.
Trochus obeliscus.	East Indies.
Trochus virgatus.	Amboyna.
Trochus Cookii.	Friendly Islands.
Trochus notatus.	South Seas.
Trochus obtusus.	Indian Seas.
Trochus hortensis.	Gardens in Southern Climates.
Trochus pusillus.	East Indies.
Trochus undulatus.	East Indies.
Trochus ventricosus.	East Indies.
Trochus annulatus.	East Indies.
Trochus olivaceus.	South Sea.
Trochus armillatus.	South Sea.
Trochus acuminatus.	South Sea.
Trochus elegantulus.	Ceylon.
Trochus badius.	South Seas.
Trochus rotularius.	Singapore.
Trochus viridis.	Singapore.
Trochus granulatus.	Singapore.
Trochus niloticus.	Singapore.
Sub-genera. Elenchus. <i>rec.</i>	
Rotella. <i>rec.</i> 10 sp.	
Monodonta. <i>rec.</i> 10 sp. ? also <i>fossil</i> .	
Delphinula. <i>rec.</i> 20 sp. <i>fossil</i> , 30 sp. ?	
Delphinula laciniata.	Singapore.
Delphinula turbinopsis	Singapore.
Sub-genera. Liotia. <i>rec.</i> 6 sp. also <i>fossil</i> .	
Cyclostrema. <i>rec.</i> 12 sp. also <i>fossil</i> .	
Adeorbis. <i>rec.</i> also <i>fossil</i> , 5 sp.	
Stomatella. <i>rec.</i> 20 sp.	
Sub-genus. Gena. <i>rec.</i> 16 sp.	
Broderipia. <i>rec.</i> 3 sp.	

### Family X. Haliotidæ.

Genera. Haliotis. Earshell, <i>rec.</i> 75 sp. <i>fossil</i> , 4 sp.	
Haliotis.	Ceylon.
Haliotis midæ.	East Indies.



## MOLLUSCA.

<i>Haliotis pulcherrima.</i>	South Sea.
<i>Haliotis striata.</i>	Asiatic Ocean.
<i>Haliotis varia.</i>	East Indies.
<i>Haliotis marmorata.</i>	East Indies.
<i>Haliotis assinina.</i>	Amboyna.
<i>Haliotis parva.</i>	China.
<i>Haliotis imperforata.</i>	East Indies.
<i>Sub-genus. Deridobranchus. rec.</i>	
<i>Stomatia. rec. 12 sp. fossil, 6 sp. 1</i>	
<i>Ianthina. Violet-snail, rec. 8 sp.</i>	
<i>Ianthina fragilis.</i>	Sowerby ; Communis, of Lamarck.

### Family XI. Fissurellidæ.

Genera. <i>Fissurella.</i>	Key-hole limpet, <i>rec. 120 sp. fossil, 25 sp.</i>
<i>Sub-genus. (Machroschisma). rec.</i>	
<i>Emarginula. rec. 25 sp. fossil, 40 sp.</i>	
<i>Parmopheorus. rec. 10 sp. fossil, 3 sp.</i>	

The *Parmaphora* or Ducks bill Limpet is found in Singapore though by no means a common shell, it is like a *Patella* flattened and elongated, the anterior edge always widely notched, apex slightly recurved, length from one to two inches, colour white; the body of the animal is much more bulky than the shell, and the mantle is so capacious that it covers the whole shell except the apex, which enables it in some degree to elude search, as it appears more like a pulpy or spongy mass than a shell; when touched, the mantle stains the hand a dark purple colour.

### Family XII. Calyptræidæ. Bonnet-limpets.

Genera. <i>Calyptræa</i>	Cup-and-saucer limpet, <i>rec. 50 sp. fossil, 30 sp.</i>
<i>Calyptræa sinensis.</i>	
<i>Sub-genera. Crucibulum. rec.</i>	
<i>Trochita. rec.</i>	

<i>Crepidula. rec. 40 sp. fossil, 14 sp.</i>	
<i>Pileopsis. Bonnet limpet, rec. 7 sp. fossil, 20 sp.</i>	

### Family XIII. Patellidæ. Limpets.

Genera. <i>Patella.</i>	Rock limpet, <i>rec. 100 sp. fossil, 100 sp.</i>
<i>Patella.</i>	<i>Aden.</i>
<i>Patella equestris.</i>	Amboyna.
<i>Patella tectum.</i>	China.
<i>Patella trochiformis.</i>	Tranquebar.
<i>Patella neritoidea.</i>	Indian seas.
<i>Patella porcellana.</i>	Indian seas.
<i>Patella laciniosa.</i>	Amboyna.
<i>Patella saccharina.</i>	Amboyna.
<i>Patella granularis.</i>	Cape of Good Hope.
<i>Patella granitana.</i>	Cape of Good Hope.
<i>Patella radiata.</i>	Moluccas.
<i>Patella coch Crata.</i>	South seas.
<i>Patella tranquebarica.</i>	Tranquebar.
<i>Patella lutea.</i>	Amboyna.
<i>Patella rota.</i>	East Indies.
<i>Patella stellifera.</i>	Friendly Islands.
<i>Patella Indica.</i>	East Indies.
<i>Patella umbellata.</i>	China.
<i>Patella fissurata.</i>	Ceylon

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<i>Patella macroschisma.</i>	Japan.
<i>Scutellina. rec. 7 sp.</i>	
<i>Acmaea. rec. 20 sp.</i>	
<i>Gadinia. rec. 8 sp. fossil, 1 sp.</i>	
<i>? Siphonaria. rec. 30 sp. fossil, 3 sp. Ceylon.</i>	

### Family XIV. Dentaliadae Tooth-shells.

Genera. <i>Dentalium. rec. 30 sp. fossil, 70 sp.</i>	
<i>Dentalium Elephantinum.</i>	Singapore.
<i>Dentalium entale.</i>	Singapore.

### Family XV. Chitonidæ.

Genera. <i>Chiton. rec. 200 sp. fossil, 24 sp.</i>	
<i>Sub-genera. Chiton. rec.</i>	
<i>Chiton aculeatus.</i>	Asia.
<i>Chiton punctatus.</i>	Asia Europe and America
<i>Chiton sulcatus.</i>	South seas,
<i>Chiton bicolor.</i>	Indian seas.
<i>Chiton fuscus.</i>	East Indies.
<i>Chiton undulatus.</i>	Indian Ocean,
<i>Chiton luteolus.</i>	Indian Ocean,
<i>Chiton olivaceos.</i>	Indian Ocean.
<i>Chiton carmichaelis.</i>	Cape of Good Hope.
<i>Chiton capensis.</i>	Cape of Good Hope.
<i>Tonicia. rec.</i>	
<i>Acanthopleura. rec.</i>	
<i>Katharina. rec.</i>	
<i>Chitonellus. rec. 160 sp.</i>	

## ORDER II. PULMONIFERA.

### Section A. In-operculata. Family I. Helicidæ. Land-snails.

Genera. <i>Helix. rec.</i>	including sub-genera, 1,200 sp. <i>fossil, 50 sp.</i>
<i>Helix melanotragus.</i>	Ceylon.
<i>Helix melanotragus, variety.</i>	Ceylon.
<i>Helix juliana, Gray.</i>	Ceylon.
<i>Helix Valtoni, Lin.</i>	Ceylon.
<i>Helix hæmastoma.</i>	Ceylon.
<i>Helix hæmastoma, variety.</i>	Ceylon.
<i>Helix nobilis.</i>	Malacca., Singapore.
<i>Helix densa.</i>	Island of Daat situated between Labuan and the coast of Borneo.
<i>Helix</i>	Neilgherries.
<i>Helix vittata, variety.</i>	Ceylon.
<i>Helix maderaspatana, variety.</i>	Bangalore.
<i>Helix nanoides.</i>	Singapore.
<i>Helix interrupta, Botanical Garden.</i>	Calcutta.
<i>Helix metaforma.</i>	Philippine Islands.
<i>Helix fallaciosa, var:</i>	Ceylon.
<i>Helix. allied to Helix carabinata.</i>	Tenasserim valley.
<i>Helix carabinata.</i>	Calcutta.
<i>Helix iloconensis.</i>	Philippine Islands.
<i>Helix sphaerica.</i>	Philippine Islands.
<i>Helix regalis.</i>	Borneo.
<i>Helix viridis?</i>	Philippines.
<i>Helix bistriata.</i>	

# MOLLUSCA.

<i>Helix bistrialis</i> , variety.	Ceylon.
<i>Helix bistrialis</i> , variety.	Madras.
<i>Helix</i> .	Ceylon.
<i>Helix</i> .	Tenasserim.
<i>Helix Bombayensis</i> .	Poona, not to be found in Bombay.
<i>Helix similaris</i> .	Island of Bombay.
<i>Helix species</i> .	Aden.
<i>Helix caracolla</i> .	Mauritius.
<i>Helix</i> .	Aden.
<i>Helix</i> .	Ceylon.
<i>Helix</i> .	Neilgherries.
<i>Helix Naikenary</i> .	Neilgherry.
<i>Helix scarabæus</i> .	Mountains of Asia.
<i>Helix oculis capri</i> .	Asia.
<i>Helix algira</i> .	Amboyna.
<i>Helix exilis</i> .	Tranquebar.
<i>Helix plicata</i> .	East Indies.
<i>Helix lucerna</i> .	East Indies.
<i>Helix unidentata</i> .	Ceylon.
<i>Helix cornu arietis</i> .	Amboyna.
<i>Helix ampullacea</i> .	Amboyna.
<i>Helix globulus</i> .	Tranquebar.
<i>Helix epistylum</i> .	South Sea Islands.
<i>Helix nemorensis</i> .	East Indies.
<i>Helix vittata</i> .	Coromandel.
<i>Helix unguina</i> .	India.
<i>Helix ovalis</i> .	East Indies Land.
<i>Helix trifasciata</i> .	Tranquebar.
<i>Helix bontia</i> .	Tranquebar.
<i>Helix labiosa</i> .	India.
<i>Helix trochoidis</i> .	East Indies.
<i>Helix læva</i> .	East Indies.
<i>Helix dissimilis</i> .	Tranquebar.
<i>Helix angularis</i> .	Canton.
<i>Helix picta</i> .	Amboyna Land.
<i>Helix calcarea</i> .	East Indies.
<i>Helix cuspidata</i> .	India Fresh water.
<i>Helix aspera</i> .	Coromandel.
<i>Helix fuscata</i> .	East Indies.
<i>Helix fluviatilis</i> .	Coromandel.
<i>Helix Lyonetiana</i> .	East Indies.
<i>Helix Amarula</i> .	Asia.
<i>Helix Zonula</i> .	Ceylon.
<i>Helix conformis</i> .	Malacca.
<i>Helix carina</i> .	East Indies.
<i>Helix sinistrorsa</i> .	Cape of Good Hope.
<i>Helix lævis</i> .	Ceylon.
<i>Helix lineata</i> .	East Indies.

Notes on the Rev. F. Mason's Paper "On the Shells of the Tenasserim Provinces." By W. H. Benson, Esq. Communicated by Dr. T. Cantor. —Beng. As. Soc. Jour. No. CC. February, 1849.

(1176) *Helix Tricumbens*, Gould. This is *Helix delibrata*, Benson, (*Journal Asiatic Society*, 1836.)

(1177) *Helix Anceps*. This shell differs from *Helix serrula*, Benson, in its more depressed spire and flatter apex, its less developed sculpture, comparatively smooth periphery, contabu-

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late whorls, and larger size with the same number of whorls. There is merely a perforation also, instead of an umbilicus. It is quite distinct and a good species, though of the same group as *H. serrula*.

(1178) *Helix Honesta*. This shell is at once distinguished from *Nanina vesicula*, Benson, by the angularity of the lost whorls, a character not so observable in *N. vesicula*.

(1179) *Helix Saturnia*. Gould. This shell is not contained in Pfeiffer's Monograph. The whorls are too few for it to agree with *H. chevalieri*, (Souleyet) and in that particular and in size it agrees better with *H. oxytes*, Benson, which may stray down thus far from the north, as well as *H. delibrata*. Without fuller characters however, it is impossible to determine.

(1180) *Helix "Zubata"*, Gould, is clearly a misprint for *H. gabata*.

(1181) *Helix Retrorsa*, (not *retorsa*.) Gould, proves to be distinct from *H. interrupta*, Benson, and *H. himalayana*, Lea. The formation of the umbilicus is peculiar. Tenasserim Provinces.

*Helix oraytes*. Benson. Naclai

*Helix textina*. Benson. Henzadda.

*Helix Laidlayana*. Benson. Tributary Mehals (2sp)

*Helix interrupta*. Ben-

son. Calcutta.

*Helix sculpturita*. B. Ava.

*Helix Bolus*. B. Thait-mio.

*Helix rotatoria*. V. de

Bush. Akontong on Irawaddi.

*Helix artificiosa*. Bens. Tenasserim, Valley.

*Helix achatina* Gray. Moulmein.

*Helix tuparia*. Benson. Teria Ghat.

*Helix Merguiensis*. Phillips. Moulmein.

*Helix climacterica*. Benson. Teria Ghat.

*Helix plectostoma*. Benson. Teria ghat.

*Helix serrula*. Benson. Teria Ghat. (3sp.)

*Helix similis*. Fer. Dacca.

*Helix honesta*. Gould. Moulmein.

1. *H. Oldhami*, B.—Ava. Procured by Mr. Oldham.

2. *H. sculpturita*, B.—Ava. What appears to be a small variety of the same shell occurs at Thait-mio, and nearly approaches *H. similis*, Fer. in aspect, though larger.

3. *H. bolus*, B.—Thait-mio. Very abundant at Thait-mio, Prome, Henzada, &c.

4. *H. pauxillula*, B.—Thait-mio, where this minute helix is rare.

5. *H. mensula*, B.—Thait-mio, Rare.

6. *H. hariola*, B.—Thait-mio, Rather rare. Inhabits Acacia trees in Jungle.

7. *H. petita*, B.—Thait-mio. Rare.

8. *H. refuga*, Gould.—Thait-mio. and Akowtong. Not very rare.

9. *H. pausa*, B.—Akowtong. Not common. Found in gardens on Arca Palms, &c.



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10. *H. rotatoria*, V. de Busch.—Akowtong. Very common, found in company with the last. This shell is rarely distinguishable from the Sylhet *H. tapeiria*, B. By the aid of a lens however the sculpture is found to be more ornate and flexuous, whilst in the latter it is simply striate.

11. *H. textrina*, B.—Henzada. Common in jungle. The adult shell has a very handsome pellucid appearance. In the rains the foot is too large for immediate retraction.

12. *H. molecula*, B.—Rangoon. This little species abounds on the Great Pagoda.

13. *H. achatina*, Gray.—Maulmein. Very abundant.

14. *H. bombax*, B.—Maulmein. Rather rare.

15. *H. honesta*, Gould.—Maulmein. Tenasserim valley. Rather common.

16. *H. Merguiensis*, Phillippi—Maulmein, Tenasserim valley. Common. Seems a var. of the next species.

17. *H. Gabata*, Gould.—Maulmein. Mergui. Common.

18. *H. capessens*, B.—Maulmein. Not very rare.

19. *H. infrendens*, B.—Maulmein. Not very rare.

20. *H. Pylaica*, B.—Maulmein. Not uncommon. This curious little shell resembles the American *H. hirsuta*.

21. *H. catinus*, B.—Maulmein. Very rare.

22. *H. cassidula*, B.—Maulmein. Rare.

23. *H. delibrata*, B. (*H. procumbens*, Gould)—Maulmein. Tenasserim valley. No where common. This species has a very wide range, being also found near Cherra.

24. *H. refuga*, var. *dextrorsa*.—Phaiethan. This dextral var. was only met with at one spot in the Tenasserim valley, where it was not rare; it is curious that *H. refuga* does not occur in the valley, but was first seen at Akowtong.

25. *H. castra*, B.—Pija. Rare. A single specimen of this Darjiling shell was found at Pija between Tavoy and Mergui.

26. *H. attegaia*, B.—Phaiethan. Not common.

27. *H. arx*, B.—Therabuin Hill. Rare. This hill has afforded many singular forms, no where else met with.

28. *H. convallata*, B.—Therabuin Hill. Rare. Another singular shell also met with near Pija on the coast between Mergui and Tavoy.

29. *H. biforcata*, B.—Therabuin Hill. A most singular shell, of which but one adult specimen was procured.

30. *H. ceryx*, B.—Phaiethan Hill. Rare.

31. *H. artificiosa*, B.—Phaiethan. Not Rare, but nowhere else found.

32. *H. causia*, B.—Phaiethan. Rare.

33. *H. forabilis*, B.—Phaiethan. Very rare.

34. *H. perpaula*, B.—Phaiethan. Very rare.

35. *H. levicula*, B.—Phaiethan. Rare.

36. *H. petasus*, B.—Phaiethan. Not rare.

37. *H. precaria*, B.—Phaiethan. Very rare.

38. *H. Saturnia*, Gould.—Tenasserim valley. Rare.

39. *H. anceps*, Gould.—Tenasserim valley. Common.

40. *H. retrorsa*, Gould.—Tenasserim valley. Common.

41. *H. acerra*, B.—Mergui. Common.

42. *H. resplendens*, Phillippi—Tenasserim valley.

43. *H. Theodori*, Phillippi—Yanglaw. Very rare.

Tabular view of the distribution of Helices in Birman and the Tenasserim Provinces.	Tenasserim Valley							
	Ava.	Phaiethan.	Akowtong.	Aangoon.	Maulmein.	Mergui.	Therabuin Hill.	Phaiethan.
<i>Helix Qldhami</i> , B. ...	*							
" <i>sculpturita</i> , B. ...	*							
" <i>bolus</i> , B. ...		*						
" <i>pauillula</i> , B. ...		*	*					
" <i>mensula</i> , B. ...		*						
" <i>hariola</i> , B. ...		*						
" <i>petita</i> , B. ...		*						
" <i>refuga</i> , Gould. ...			*					
" <i>pausa</i> , B. ...			*					
" <i>rotatoria</i> , V. de Busch. ...			*					
" <i>textrina</i> , B. ...			*					
" <i>molecula</i> , B. ...				*				
" <i>achatina</i> , Gray. ...					*			
" <i>bombax</i> , B. ...					*			
" <i>capessens</i> , B. ...					*			
" <i>infrendens</i> , B. ...					*			
" <i>Pylaica</i> , B. ...					*			
" <i>catinus</i> ...					*			
" <i>cassidula</i> , B. ...					*			
" <i>delibrata</i> , B. ...					*	*		
" <i>Merguiensis</i> , Philippi, ...					*	*		
" <i>Gabata</i> , Gould. ...					*	*		
" <i>honesta</i> , Gould. ...					*	*	*	
" <i>castra</i> , B. ...					*	*		
" <i>refuga</i> , var. <i>dextrorsa</i> , ...					*	*	*	
" <i>Saturnia</i> , Gould. ...					*	*	*	
" <i>retrorsa</i> , Gould. ...					*	*	*	
" <i>acerra</i> , B. ...					*	*		
" <i>resplendens</i> Philippi, ...					*	*		
" <i>anceps</i> , Gould. ...					*	*	*	
" <i>arx</i> , B. ...					*	*	*	
" <i>convallata</i> , ...					*	*	*	
" <i>biforcata</i> , B. ...					*	*	*	
" <i>attegia</i> , B. ...					*	*	*	*
" <i>ceryx</i> , B. ...					*	*	*	*
" <i>artificiosa</i> , B. ...					*	*	*	*
" <i>causia</i> B. ...					*	*	*	*
" <i>forabilis</i> , B. ...					*	*	*	*
" <i>perpaula</i> , B. ...					*	*	*	*
" <i>levicula</i> , B. ...					*	*	*	*
" <i>petasus</i> , B. ...					*	*	*	*
" <i>precaria</i> , B. ...					*	*	*	*
" <i>Theodori</i> , Philippi, ...					*	*	*	*

*Sub-genera*, *Anastoma*. *H. globulosa*. *rec.* 4 sp. *Streptaxis petiti*, the name of the author ("So-leget.") Tenasserim Provinces.

*Streptaxis Petiti*, Gould. *Moulmein. Tenasserim Valley.*

*Streptaxis. Calcutta?*

*Stenopus (cruentatus)*. *Syn. Nanina. Ariophanta*, *rec.* 70 sp.

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*Sub Genus* (Stenopus.) *Helix lævipes*, variety.  
*Bombay*.

*Sub Genus* (Stenopus.) *Helix lævipes*, variety,  
from the Island of *Elephanta*, *Bombay*.

*Sub Genus* (Stenopus.) *Helix lævipes*, young.

*Sub Genus* (Stenopus.) *Helix lævipes*, White  
variety.

*Hypostoma*, *rec.*

*Nanina*, from the Island of *Daat* situated be-  
tween *Labuan* and the coast of *Borneo*.

*Nanina*. *Helix vitrinoides*, *Island of Bombay*.

*Nanina*. *Helix naninia*, *Jaffna*.

*Nanina*. *Helix*. *Ceylon*.

*Nanina*. *Helix*. (*nanina*.) *Pegu*.

(1182) *Nanina Nana*.

Shell rather small, convex-conoidal, pale  
brownish; whorls six to seven, closely convolut-  
ed, the last rounded; aperture rather wide; lip  
simple; umbilicus evanescent; apex very obtuse.  
Lat. 0.1 poll.

*Helix nana*, *Hutton, Jour. As. Soc. vii. 212.*  
pt. 1.

*Pfr. Mon. Helic. i. 31.*

*Hab.* Simla, Himalaya.

(1183) *Nanina Cacuminifera*.

Shell with a covered umbilicus, conic, trochi-  
form, horn-coloured; spire attenuated towards  
the blunt, nipple-shaped apex; whorls eight,  
slowly increasing, flattened above and marked  
with seven spiral, minutely granulate lines, with  
more minute similar intermediate ones; last whorl  
acutely compressed and keeled, convex, polished  
and with radiating striae beneath; aperture secu-  
riform; peristome sharp, with the lip scarcely di-  
lated and reflected above. Height 10, greatest  
breadth 19, least breadth 16 mill.

*Helix cacuminifera*, *Benson, in Ann. and Mag.*  
*Nat. Hist. 1850, arch, 214.*

*Reere, n. 744. t. 124.*

*Pfr. Mon. Suppl. 36.*

*Hab.* Neilgherries, (*Jerdon*).

(1184) *Nanina Fastigiata*.

Shell imperforate, elevate-conic, very thin, near-  
ly smooth, little shining, pellucid, whitish horn-  
coloured; spire conic; apex rather pointed; su-  
ture impressed, bordered; whorls seven, moderate-  
ly convex, the last acutely keeled, not descend-  
ing anteriorly, rather flat beneath and impressed  
in the centre; aperture nearly perpendicular, de-  
pressed, somewhat quadrangular; peristome sim-  
ple, straight, with the margins almost parallel;  
columellar margin short, callous. Height  $4\frac{1}{3}$ ,  
breadth 4 mill. (*Pfr.*)

*Helix fastigiata*, *Hutton, Journ. As. Soc. vii.*  
217, pt. 1.

*Weigm. Arch. 1839, ii. 222.*

*Pfr. Mon. i. 87 n. 57; Ic. n. 919. t. 141. f.*  
15. 16; *Mon Suppl. 40.*

## MOLLUSCA.

*Hab.* Simla, Himalaya.

(1185) *Nanina vesicula*.

Shell perforate, conoidal-depressed, thin, near-  
ly smooth, shining, translucent, pale horn-colour-  
ed; spire short, conoidal, with the apex acumi-  
nate; suture deep; whorls six, the last one round-  
ed, not descending, convex beneath; aperture near-  
ly perpendicular, lunate-rounded, of equal height  
and breadth; peristome simple, sharp, with the  
columellar margin perpendicular, reflected into  
a short, triangular lamina near the perforation.  
Height  $7\frac{1}{2}$ , greatest breadth 15, least breadth  
13. mill. (*Pfr.*)

*Nanina vesicula*, *Benson Journ. As. Soc. vii.*  
216. *Alber 59* (*Xesta*.)

*Helix vesicula Pfr. Mon. i. 48 n. 88; Ic. n.*  
820 t. 129, f. 21, 52; *Mon. Suppl. 47.*

*Hab.* Himalaya Mountains.

(1186) *Nanina orcula*.

Shell scarcely perforate, conic-globular, thin,  
with irregular rib-like striae, rough, horn-colour-  
ed, translucent; spire obtusely conic; suture  
deep; whorls three and a half, rounded, the last  
imperceptibly descending; aperture very oblique,  
lunate-roundish; peristome simple, straight, with  
the margins somewhat convergent; columellar  
margin a little reflected, half covering the per-  
foration. Height  $1\frac{3}{4}$ , breadth 2 mill. (*Pfr.*)

*Helix orcula*, *Benson, Ann. and Mag. N. H.*  
2nd ser. vi. 251. *Pfr. Ic. n. 882. t. 136. f. 18-*  
20; *Mon. Suppl. 42.*

*Hab.* Bengal and Bahar, India.

(1187) *Nanina Bimaensis*.

Shell subperforate, obtusely conoidal, oblique-  
ly striate, quite milk-white; spire elevated, with  
the apex blunt, polished; whorls six and a half,  
flattened, not shining beneath; aperture round-  
ish trapeziform; peristome simple, sharp; colu-  
mellar margin reflected at its insertion, almost  
covering the perforation. Height 31, greatest  
breadth 32, least breadth 29 mill. (*M.*)

*Nanina Bimaensis*, *Mousson, Fav. Moll. 111. t.*  
21. f. 1. *Alb. 60* (*Hemiplecta*).

*Helix Bimaensis*, *Pfr. Mon. Suppl. 45.*

*Hab.* Island of Bimah (*Zollinger*).

(1188) *Nanina rareguttata*.

Shell subperforate, orbicularly conoidal, striat-  
ed, nearly smooth, yellow, conspersed with scarce-  
ly elongated oily spots; whorls five and a half,  
enlarging rapidly, moderately convex, the last  
somewhat inflated, declivous above, convex be-  
neath, uniform or with a single brownish band;  
spire short, with the apex diaphanous; aperture  
large, obliquely roundish-lunate, flesh-coloured  
within; peristome simple, straight; columellar  
margin sharp, reflected at its insertion. Height  
26, greatest breadth 32, least breadth 26.55 mill.  
(*M.*)

*Helix rareguttata*, *Mousson, Fav. Moll. 112. t.*



# MOLLUSCA.

*Reeve. n. 492. t. 91.*

*Pfr. Mon. Suppl. 45.*

*Hab. Island of Bimah.*

(1189) *Nanina trochus*.

Shell imperforate, trochiform, conic, white, with a broad red band, apex obtuse. Lat. 10 lin.

*Helix trochus, Mull. Verm. ii. 79. n. 275.*

*Chemn. ed 2. Helix, n. 127. t. 21. f. 13, 14.*

*Pfr Mon Helic. i. 46.*

*Trochus hortensis, Chemn, ix. pt. 2. 52. t. 122. f. 1055, 1056.*

*Nanina trochus, Beck, Ind. 4.*

*Hab. East Indies?*

(1190) *Nanina Zecythis*.

Shell scarcely perforate, conoidal-depressed, thin, nearly smooth, shining, translucent, pale reddish horn-coloured, variegated with paler spots; spire short, conoidal, rather acuminate; suture moderate; whorls six, very little convex, the last one broader, not descending, rather flattened beneath; aperture nearly perpendicular, broadly lunate, its breadth surpassing its height; peristome simple, sharp, with the columellar margin arcuate, somewhat declivous, very shortly reflected above. Height 7, greatest breadth 13, least breadth  $10\frac{1}{2}$  mill. (*Pfr.*)

*Helix Zecythis, Benson in Ann. & Mag. N. H. 1852, May, 406. Pfr. Ic. n. 936 t. 143. f. 12-14; Mon. Suppl. 47.*

Larger, with the spire more raised and seven whorls. Height 9, breadth 15 mill. (*Pfr. Ic. t. 143. f. 15.*)

*Hab. Rajmahal Hills, India (Bacon.)*

(1191) *Nanina subjecta*.

Shell perforate, conoidally depressed, thin, striated, oily shining, diaphanous, horn-coloured; spire shortly conoidal, rather pointed; suture slight, whitish; whorls six and a half, very little convex, the last broad, somewhat depressed, not descending, little convex beneath; aperture not very oblique, roundish-lunate, broader than high; peristome simple, straight, columellar margin slightly receding, arched, very shortly reflected above. Height 9, greatest breadth 17, least breadth 14 mill. (*Pfr.*)

*Helix spreta, Benson MSS. olim, not Adams.*

*Helix subjecta, Benson in Ann & Mag. N. H. 1852, May, 407. Pfr. Ic. 935. t. 143 f. 9-11; Mon. Suppl. 48.*

*Hab. Rajmahal Hills, India.*

(1192) *Nanina nuda*.

Shell scarcely perforate, conoidally depressed, thin, faintly striated, pellucid, pale fulvid horn-coloured; spire conoidal, rather acute; suture impressed, slightly bordered with white; whorls six, moderately convex, the last larger, inflated, not descending; aperture almost diagonal, roundish-lunate, broader than high; peristome simple, straight, with the margins somewhat convergent;

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lar margin slightly receding, arched, dilated and reflexed above. Height 7, greatest breadth 11, least breadth  $9\frac{3}{4}$  mill. (*Pfr.*)

*Helix nuda, Pfr. in Proc. Zool. Soc. 1852. p.; Ic. n. 1102. t. 161. f. 16, 17; Mon. Suppl. 48. Reeve. n. 781. t. 129.*

*Hab. Himalaya Mountains (Fortune.)*

(1193) *Nanina glauca*.

Shell subperforate, orbiculate-conoidal, quite glabrous, bright, bluish-hyaline; spire elevated, rather acute; whorls six and a half, slightly convex, the last much wider, rounded; aperture subvertical, lunar; peristome simple, straight; columellar margin scarcely dilated, nearly closing the perforation. Lat. maj.  $12\frac{1}{2}$ , min. 11, alt.  $7\frac{3}{4}$  mill.

*Nanina glauca, Benson (teste Busch).*

*Helix glauca, Bens. Pfr. Symb. iii. 65.*

*Phil. Icon. iii. 17, Helix. t. 10, f. 8.*

*Chemn. ed. 2. Helix n. 539. t. 87. f. 1-3*

*Pfr. Mon. Helic. i. 48; Ic. ii. 118.*

*Reeve, n. 7711. t. 123.*

*Nanina (Xesta) glauca, Alb. 59.*

*Hab. Bengal.*

(1194) *Nanina fragilis*.

Shell thin, fragile, glassy, olivaceous, conic-discoidal; spire slightly exserted, apex obtuse; whorls five, convex above, subplanulate beneath; aperture oblique, rounded-ovate; peristome acute. Lat. 0-35 poll.

*Nanina fragilis, Hutton. Journ. As. Soc. vii. 216.*

*Helix fragilis, Pfr. Mon. Helic. i, 48.*

*Bens. in Ann. & Mag. Nat. Hist. 2nd ser. ii. 163.*

*Hab. Kirmalliab, Himalaya.*

(1195) *Nanina Bajadera*.

Shell reversed, globose-conoidal, rather thin, fulvid, with strong longitudinal folds, which are smaller alternately; spire conoidal, with the apex rather blunt, reddish-brown; whorls four, rather convex, the last one inflate, rather sharply keeled in the middle, descending anteriorly, compressed beneath near the umbilicus, which is extremely narrow; aperture large, oblique, lunate-roundish; peristome simple, straight columellar margin broadly dilated and reflected above. Height 20, greatest breadth 30, least breadth 25 mill. (*Pfr.*)

*Helix Bajadera, Pfr. in Z. f. M. 1850, 69; Ic. n. 860. t. 133. f. 10, 11; Mon. Suppl. 52. Reeve, n. 388. t. 75.*

*Hab. Bombay (Benson.)*

(1196) *Nanina oblita*.

Shell perforate, rather lenticular, very thin, with crowded arcuate folds above; pellucid, pale horn-coloured; spire depressed-turbinate, rather pointed; whorls six, very little convex, the last not descending anteriorly, surrounded at the periphery with an obtuse, denticulated keel, more convex and with radiating striae beneath.

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ple, thin, straight: basal margin slightly arched, shortly reflected near the perforation. Height  $11\frac{1}{2}$ , greatest breadth 23, least breadth 20 mill. (Pfr.)

*Helix oblita*, Pfr in *Proc. Zool. Soc.* 1851, p.; *Mon. Suppl.* 54.

*Reeve*, n. 444. t. 83.

*Hab.* India.

(1197) *Nanina Baconi*.

Shell narrowly perforate, depressed turbinate, very thin, pellucid, pale horn-coloured, elegantly decussate by wrinkled striæ and silky shining above, polished beneath with radiating striæ; spire conoidal, with the apex rather pointed, brownish; suture impressed; whorls five, rather convex, slowly increasing, the upper ones bordered above with a reddish-brown narrow band, the last one not descending anteriorly, keeled, convex beneath; aperture nearly perpendicular, lunate, angular; peristome sharp, with the margins convergent; columellar margin perpendicular, forming a rounded angle, with the basal one very shortly reflected above. Height  $8\frac{1}{2}$ , greatest breadth 14, least breadth 13 mill. (Pfr.)

*Helix Baconi*, Benson, in *Ann. & Mag. Nat. Hist.* 2nd ser. vi. 251.

*Pfr.*  *Ic.* n. 917. t. 141. f. 11, 12; *Mon. Suppl.* 55.

*Hab.* Moradabad, North India. (Bacon)

(1198) *Nanina infula*.

Shell subperforate, trochiform, thin, pellucid, whitish horn-coloured, with the upper surface little shining, slightly striate and girdled with elevated, concentric, somewhat distant lines; spire conic, with the apex rather pointed; whorls six, moderately convex, the last one keeled, more shining and nearly smooth beneath; aperture rather oblique, transversely square, lunate; peristome simple, sharp, straight; columellar margin nearly perpendicular, a little dilated and very shortly reflected above. Height 7, greatest breadth 8, least breadth  $7\frac{1}{2}$  mill. (Pfr.)

*Helix infula*, Benson, in *Ann. & Mag. N. H.* 2nd ser. ii. 160.

(Pfr.)  *Ic.* n. 804. t. 127. f. 24, 25; *Mon. Suppl.* 53.

*Reeve*, n. 783 t. 129.

*Helix turbiniformis*, Benson, in *Journ. As. Soc.* (olim.)

*Hab.* From the vicinity of the town of Murshedabad, Bengal, and of the Hill of Patharghata in the province of Bahar, India.

(1199) *Nanina Barrakporensis*.

Shell subperforate, raised-trochiform, thin, faintly striated, shining, pellucid, brownish horn-coloured; spire conic, rather acuminate; suture deep; whorls six, convex, enlarging gradually, the last keeled, not descending, rather convex beneath; aperture scarcely oblique, depressed, lunate, somewhat angular; peristome simple, thin, straight; columellar margin short, a little reflected near the punctiform perforation. Height

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*Helix Barrakporensis*, Pfr. in *Proc. Zool. Soc.* 1851. p.;  *Ic.* n. 969. t. 147. f. 20-22; *Mon. Suppl.* 59.

*Reeve*, n. 816. t. 132.

*Hab.* Barrackpore, India (Bacon).

(1200) *Nanina semifusca*.

Shell orbiculate, depressed, thin, fragile, horny, smooth, slightly angulated at the margin, perforated beneath; aperture ovate semilunar, margins very thin, acute; whorls narrow, slightly convex. Lat. maj. 18, min. 15, alt. 9. mill.

*Helix semifusca*, Desh. in *Belanger Voy. Zool.* p. 414. t. 1. f. 8-10.

*Pfr. Mon. Helic.* i. 54.

*Hab.* Pondicherry.

(1201) *Nanina decussata*.

Shell perforate, depressed, thin, nearly smooth, very minutely decussated above under a strong lens, silky shining, pale reddish horn-coloured; spire little raised; apex blunt; suture slight, bordered; whorls six, moderately convex, enlarging gradually, the last not descending, obsoletely angled at its periphery, rather flattened beneath; aperture little oblique, depressed, lunate, somewhat angular; peristome simple, straight, with distant margins; columellar margin scarcely arched, declivous, very shortly reflected above. Height 11, greatest breadth 25, least breadth  $21\frac{1}{2}$  mill. (Pfr.)

*Helix decussata*, Benson. *Pfr. Mon.* i. 70. n. 158;  *Ic.* n. 922. t. 141. f. 23, 24; *Mon. Suppl.* 62.

*Reeve*, n. 743. t. 124.

*Hab.* Bengal.

(1202) *Nanina vitrinoides*.

Shell subperforate, depressed, thin, smooth, fragile pale horny; spire scarcely elevated; suture margined; whorls six, very slightly convex, the last wide, more convex beneath; aperture widely lunar; peristome simple, straight, acute, columellar margin scarcely reflected. Lat. maj. 23, min. 21, alt. 12 mill.

*Animal*, Gray. *fig. Moll.* t. 71. f. 5.

*Helix vitrinoides*, Desh. in *guer. Mag.* 1831, t. 26; *Encycl. Meth.* ii. 225. n. 51.

*Chemn.* ed. 2. *Helix.* n. 689. t. 110. f. 10-15 *Pfr. Mon. Helic.* i. 56.

*Strickland* in *Proc. Zool. Soc.* 1848, p. 142; *Moll.* t. 2. f. 1-3.

*Reeve*, n. 151. t. 34.

*Helix petrosa*, *Hutt. Journ. Asiat. Soc.* iii. 83.

*Pfr. Mon.* i. 56. n. 114. (fide Benson in *Ann. & Mag. N. H.* 2nd ser. ii. 163)

*Nanina* (Xesta) *vitrinoides*, *Alb.* 59.

*Nanina vitrinoides*, Gray. *Proc. Zool. Soc.* 1834, 58; *Fig. Moll.* iv. 111. t. 71. f. 5.

*Helicella vitrinoides*, Beck, *Ind.* 6.

*Vitrina subcentralis*, Beck, *MSS.*

*Hab.* Bombay; Philippines.

(1203) *Nanina resplendens*.

Shell subperforated, depressed, quite glabrous, shining, thin, pellucid, lutescent-horny; spire



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slightly convex, increasing gradually, the last regularly augmented, slightly convex beneath, deeply impressed in the middle; aperture nearly vertical, depressed, wide, lunar; peristome simple, acute; columellar margin descending very obliquely, basal very slightly reflected in the centre. Lat. maj. 19, min. 16½, alt. 9 mill.

*Helix resplendens*, *Phil. in Zettschr. f. Malak.* 1846, 192.

*Chemn. ed. 2. Helix.* n. 688. t. 110. f. 7-9. *Pfr. Mon. Helic.* i. 56.

*Reeve*, n. 430. t. 81.

*Nanina resplendens*, *Trosch, in Arch. f. Nat.* 1849, i. 234. *Alb.* 59 (Xesta.)

*Helix expolita*, *Desh, in Fer.* i. 190. n. 255. t. 87. f. 1.

*Hab.* Birmah, near Mergui.

(1204) *Nanina Maderaspatana*.

Shell very narrowly umbilicated, depressedly-globose, striately wrinkled, pale rufous, white-zoned and clouded; whorls five to six, scarcely convex, the last slightly inflated; aperture oblique, lunate-oval; peristome simple, rather thickened at the umbilicus, reflected. Lat. maj. 32, min. 26½, alt. 19 mill.

*Helix Maderaspatana*, *Gray in Proc. Zool. Soc.* 1834, 67.

*Mull. Synops.* 9.

*Chemn. ed. 2. Helix.* n. 170. t. 31. f. 7, 8.

*Pfr. Mon. Helic.* i. 63; *Id.* i. 203,

*Reeve*, n. 392. t. 75.

*Helix Korekouke* (*Helicella*), *Fer. Pfr.* 237 and *illus.*

*Desh. l. c.* 180. n. 241 t. 102. f. 7-9.

*Nanina* (*Ryssota*) *Maderaspatana*, *Alb.* 61.

*Helix pondicheriensis*, *Pfr. Symb.* i. 38.

*Nanina Korekouke*, *Beck. Ind.* 4.

*Hab.* E. India, Pondicherry, Madras, &c.

(1205) *Nanina lubrica*.

Shell perforate, depressed, indistinctly radiatingly striated, very polished, yellow-fulvid or olivaceous; spire nearly flat, with the apex scarcely prominent, blunt; suture slightly channeled; whorls five, the last rounded, convex beneath; aperture scarcely oblique, broadly lunate; peristome sharp, sometimes with a rather distant whitish internal lip; columellar margin descending obliquely, slightly sinuate, somewhat thickened and slightly reflexed above. Height 11, greatest breadth 24, least breadth 20 mill. (B)

*Helix lubrica*, *Benson, in Ann. and Mag. N. H.* 2nd ser. x. p.

*Reeve*, n. t.

*Pfr. Mon. Suppl.* 629.

*Hab.* Darjiling, Sikkim-Himalaya (*Trotter*).

(1206) *Nanina honesta*.

Shell subperforated, orbiculate, smooth, bright pellucid, horny-whitish; spire depressedly conoidal, slightly papillate; whorls 5, very slightly

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angulated at the outline, convex beneath; aperture widely lunar; peristome simple, straight, basal margin smoothly arched, columellar very slightly reflected above. Lat. maj. 13, min. 11½ alt. 7½ mill.

*Helix honesta* *Gould, MSS.*

*Pfr. Mon. Helic.* i. 57.

*Reeve*, n. 452 t. 84.

*Hab.* Birmah.

(1207) *Nanina Perrotteti*.

Shell perforate, depressed, rather thin, smooth, lucid, horn-coloured; spire scarcely subturinate, with the apex rather pointed; suture slight, simple; whorls five and a half, scarcely convex, the last one somewhat depressed, not descending, rather flattened beneath; aperture nearly perpendicular, depressed, lunate; peristome simple, straight, scarcely reflected near the open perforation. Height 4, greatest breadth 8, least breadth 7 mill (*Pfr*).

*Helix Perrotteti*, *Pfr. in Z. f. M.* 1851, 13; *Id.* n. 1088, t. 159. f. 41-44; *Mon. Suppl.* 63.

*Hab.* The Neilgherries (*Perrottet, Guerin*)?

(1208) *Nanina planiuscula*.

Shell rather small, depressed, brown, polished; whorls five, the last rounded at the margin; aperture transverse. Lat. 0, 1 poll.

*Helix planiuscula*, *Hutt. Journ. As. Soc.* vii. pt. 1. p. 218. *Pfr. Mon. Helic.* i. 60.

*Hab.* Simla, Himalaya.

(1209) *Nanina interrupta*.

Shell sinistral, orbiculate-convex, tumid beneath, umbilicated, obtusely angled at the outline, very closely striated longitudinally, with interrupted bands transversely disposed above the striae; apex obtuse; peristome thin, acute, Lat.—?

*Helix interrupta*, *Benson. Proc. Zool. Soc.* 1834, 90.

*Mull. Synops.* 10.

*Bens. Zool. Journ. Pfr.* v. 461.

*Pfr. Mon. Helic.* i. 63.

*Ariophanta interrupta*, *Beck. Ind.* 5. 4.

*Nanina interrupta*, *Pfr. Symb.* ii. 63.

*Hab.* India; Sicrigale.

(1210) *Nanina solata*.

Shell perforate, depressed-globose, radiately striated, shining, bluish-white, reddish-brown anteriorly and of a reddish-chestnut colour towards the apex, with very numerous translucent points, with one chestnut-coloured band above the angle of the penult whorl, and one to three obsolete bands beneath; whorls five, moderately convex, the last rather angled, rounded anteriorly; spire blunt; aperture oblique, transversely ovate-lunate; peristome brownish chestnut-coloured within, bordered with white; labrum straight, deflected, with the columellar margin rather reflected, nearly covering the umbilicus. Height 11, greatest breadth 23, least breadth

*Helix solata*, Benson in *Ann. and Mag. N. H.* 2nd ser. ii. 159. *Pfr. Mon. Suppl.* 66.

*Reeve*, n. 741. t. 24.

*Hab.* South India; The Neilgherries (*Jerdon*) (1211) *Nanina Theodori*.

Shell perforated, depressed, thin, subdiaphanous, horny-lutescent, very closely costulated above, decussated with impressed concentric lines, smoother beneath, excentrically striatulated with concentric lines gradually vanishing towards the perforation; spire scarcely elevated, rather obtuse; suture impressed, obsoletely margined with red; whorls six and a half, very slightly convex, gently increasing, the last obsoletely angulated; aperture depressed, lunar; peristome simple, straight, columellar margin descending very obliquely, very slightly reflected above. Lat. maj. 26, min. 23, alt. 13 mill.

*Helix Theodori*, *Phil. in Zeitschr. f. Malak.* 1846. 191.

*Chemn.* ed. 2, *Helix*, n. 687, t. 110. f. 1-3.

*Pfr. Mon. Helic.* i. 70.

*Nanina* (Hemiplecta) *Theodori*, *Alb.* 60.

*Hab.* E. Indies; Mergui.

(1212) *Nanina bistrialis*.

Shell slightly perforated, globosely depressed, thin, fragile, very finely striated, under a lens decussated with close, obsolete striae, horny straw-coloured, zoned in the middle with two close red lines; spire scarcely convex; whorls four, nearly level, rapidly increasing; aperture ample, lunar-oval; peristome simple, columellar margin recurved. Lat. maj. 31, min. 25, alt. 15 mill.

*Nanina bistrialis*, *Beck Ind.* 2.

*Pfr. Symb.* ii. 17.

*Alb.* 59. (Xesta).

*Helix bistrialis*, *Chemn.* ed. 2, *Helix*, n. 61. t. 11. f. 10, 11.

*Pfr. Mon. Helic.* i. 71; *Id.* i. 90.

*Desh.* 186. n. 249.

*Reeve*, n. 483. t. 90.

*Helix exilis*, *Chemn.* ix. pt. 2. 121. t. 129 f. 1149; not *Mull.* (*Helicella*) *Fer. Pr.* 236; *Hist.* t. 92. f. 1.

*Helix diaphana*, *Lea, Obs.* 166. t. 19. f. 65. (not *Lam.*).

*Hab.* Pondicherry, Tranquebar.

(1213) *Nanina vitellina*.

Shell perforate, depressed-globose, scarcely shining, brownish orange-coloured, very minutely decussated above; spire shortly conoidal, rather blunt; whorls five and a half, moderately convex, the last one somewhat descending anteriorly, scarcely striate below its periphery, which sometimes is obsoletely angulated, white round the umbilicus, which is contracted and extremely narrow; aperture oblique, lunate-rounded; peristome simple, with the margins distant, columellar margin white, thickened and reflected, rather dilated above. Height 18, greatest breadth 29,

*Helix vitellina* *Pfr. in Proc. Zool. Soc.* 1848, 109; *Z. f. M.* 1848, 92; *Id.* n. 763. t. 122. f. 22. 23; *Mon. Suppl.* 72.

*Reeve*, n. 390. t. 75.

*Hab.* Base of the Neilgherries. (*Jerdon*, *Benson*).

(1214) *Nanina ligulata*.

Shell perforated depressedly-globose, longitudinally striated above, minutely decussated, glabrous beneath, white, zoned with a single, rather broad, luteous band, above the outline; whorls five, planulate, the last convex beneath; aperture irregularly lunate-elliptical; peristome simple, dextral margin straight, columellar slightly reflected, forming an obsolete angle with the basal. Lat. maj. 26, min. 23, alt. 17 mill.

*Helix ligulata* (*Helicogena*), *Fer. Pr.* 47; *Hist.* t. 31 f. 2,

*Pfr. Symb.* i. 38; *Mon. Helic.* i. 71; *Id.* i. 206.

*Chemn.* ed. 2, *Helix*, n. 174. t. 33. f. 1, 2.

*Desh.* 180. n. 240

*Reeve*, n. 395. t. 76-83.

*Helix semisculpta*, *Mus. Reg. Berl.* olim.

*Nanina ligulata*, *Beck Ind.* 4.

*Alb.* 59 (Xesta).

*Hab.* Bengal.

(1215) *Nanina bombayana*.

Shell subglobose, a little depressed, subdiaphanous, bright, pale rosy, very finely striated longitudinally; whorls five, convex; umbilicus rather small; aperture semi-rotund; lip sharp, white outside. Lat. 26, alt. 20 mill.

*Helix Bombayana*, *Grat. Act. Bord.* ii. 406. t. 1. f. 1.

*Pfr. Mon. Helic.* i. 41.

*Hab.* Bombay.

(1216) *Nanina chastellii*.

Shell perforated, depressed, lenticular, keeled, obliquely striated, whitish, variegated diversely with brown spots, white-zoned in the middle; whorls six to six and a half, planulate; aperture rather angularly lunar, brown inside; peristome simple, acute, columellar margin dilated, reflected, not hiding the perforation. Lat. maj. 27, min. 24, alt. 14 mill.

*Helix Chastellii* (*Helicella*), *Fer. Hist.* (1832) t. 80. f. 4.

*Chemn.* ed. 2. *Helix* n. 445. t. 74. f. 8-10.

*Pfr. Mon. Helic.* i. 78.

*Desh.* 106. n. 144.

*Pfr. Id.* ii. 53.

*Helix Cracherodii*, *Gray. Proc. Zool. Soc.* 1834, 67. *Muller Synops.* 9.

*Hab.* E. Indies? (*Mus. Gray*).

(1217) *Nanina anceps*.

Shell scarcely perforated, lenticular, pale horny, acutely keeled, striated above, shining beneath; whorls six, very slightly convex, the last more convex beneath, smooth, marked below the compressed, slightly prominent keel with a few im-



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nar ; peristome simple, thin, columellar margin very slightly reflected. Lat. maj. 17. min, 16 alt. 9 mill.

*Caracolla anceps*, *Gould in Bost. Journ.* iv. 4. 454. t. 24, f. 4.

*Helix anceps*, *Chemn.* ed. 2. *Helix*. n. 551. t. 88. f. 8-10.

*Pfr. Mon. Helic.* i. 80; *Id.* ii. 126.

*Reeve*. n. 155, t. 35.

*Helix* (*Thea*) *anceps*, *Alb.* 113.

*Helix serrula* *Benson*. fide *Mason. in Journ. As. Soc.* xvii.

*Hab.* Tavoy, Birman Empire.

(1218) *Nanina indica*.

Shell perforated, orbiculate-convex, rather solid, closely costulate-striated above, granulately decussated with close impressed lines, entirely fulvous; whorls five and a half nearly level, the last more convex beneath, smooth, marked beneath the keel with a few impressed concentric lines; aperture angularly-lunar; peristome straight, white, columellar margin slightly thickened, rather reflected above. Lat. maj. 22, min. 19, alt. 11 mill.

*Helix indica*, *Pfr. Symb.* iii. 66; *Mon. Helic.* i. 80.

*Reeve*, n. 448. t. 83.

*Hab.* E. Indies; Nilagirie Mountains.

(1219) *Nanina acuducta*.

Shell perforate, thin, lenticular, conic; sharply keeled, with rib-like striae above, which are very closely decussated and granulated by impressed lines; spire scarcely raised; apex rather blunt; whorls five, flattened, nearly contabulate, the last ventricose and smooth beneath, marked with numerous impressed spiral lines; keel compressed beneath; aperture lunate, angled, nearly axe-shaped; peristome thin, simple, columellar margin very shortly reflected above. Height 11, greatest breadth 22, least breadth 19 mill. (*Bens.*)

*Helix acuducta*, *Benson in Ann. & Mag. N. H.* 1850, March, 214.

*Reeve*, n. 739 t. 214.

*Pfr. Mon. Suppl.* 78,

*Hab.* Neilgherry Mountains, South India (*Jerdon.*)

(1220) *Nanina Humphreysiana*.

Shell openly perforated, orbiculate-conoidal, convex beneath, rugosely granulated, fulvous-yellow, chestnut-banded at the margin; spire elate, rather acute; whorls six to seven, slightly convex, the last compressed around the perforation; aperture oblique, lunar; peristome simple, acute, columellar margin scarcely reflected. Lat. maj. 53, min. 47, alt. 33 mill.

*Helix Humphreysiana*, *Lea. Trans. Am. Phil. Soc.* vii. 453. t. 12. f. 16.

*Chemn.* ed 2, *Helix*, n. 168. t. 31. f. 3. 4.

*Fer. Hist. livr* 34. t. 2. f. 7.

*Pfr. Mon. Helic.* i. 43; *Id.* i. 201.

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*Reeve*, n. 387, t. 74.

*Nanina* (*Hemiplecta*) *Humphreysiana*, *Alb.* 60.

Var. *H. gemina*, *V. d. Busch, Pfr. Mon.* i. 43. n. 73.

*Reeve*, n. 374. t. 73.

*Hab.* Pondicherry; Singapore.

(1221) *Nanina bullula*.

Shell rather small, glabrous, translucent, subtrochiform, conoidal; whorls five, convex, the last rounded; suture impressed; umbilicus narrowed; aperture wider; lip simple. Lat. 0-15 poll.

*Helix bullula*, *Hutton, Journ. As. Soc.* vii. pt. 1. 218.

*Pfr. Mon. Helic.* i. 86.

*Reeve*, n. 819. t. 133.

*Hab.* Simla, Himalaya.

(1222) *Nanina humilis*.

Shell subturbinata, slightly striated, horn-coloured, brownish, diaphanous, oily glistening; spire convexly conoidal, with the apex rather pointed; whorls five, rounded, the last one not descending anteriorly, obsoletely angulated at its periphery; umbilicus broad and deep; aperture very oblique, nearly circular; peristome simple, sharp, straight, with the columellar margin not reflected. Height 2, greatest breadth  $3\frac{1}{2}$ , least breadth 3 mill. (*Pfr.*)

*Helix humilis*, *Hutton, Pfr. Mon.* i. 106 n. 267; *Id.* n. 823. t. 129. 28-30; *Mon. Suppl.* 83.

*Reeve*, n. 825. t. 133.

*Hab.* Landour, India (*Benson*).

(1223) *Nanina? Belangeri*.

Shell orbiculate-globose, slightly depressed, translucent, rosy, whitish beneath, umbilicated, decussated above with thin striae; aperture large, oblique; lip simple. Lat. maj. 46, min. 37, alt. 28 mill.

*Helix Belangeri*, *Desh. in Belang. Voy. Zool.* 43. t. 1, f. 1-3.

*Lam. ed. Desh.* 157. p. 101.

*Pfr. Mon. Helic.* i. 69; *Encycl. Meth.* ii. 233 n. 69, & in *Fer.* 100, n. 137. t. 69 1. f. 4.

*Nanina Belangeri Beck Ind.* 4.

*Hab.* Pondicherry; Malabar.

(1224) *Nanina labiata*.

Shell openly perforated, depressed, thin, striatulate, obsoletely decussated above with concentric lines, beneath smooth, bright, fulvous; spire nearly level; whorls six, subplanulate, the last dilated, depressed; aperture wide, lunar; peristome acute, usually rufescent, callous-lipped, internally, upper margin rounded in front, basal evenly subarcuated columellar very slightly reflected. Lat. maj. 40, min. 35, alt. 20 mill.

*Helix labiata*, *Pfr. in Proc. Zool. Soc.* 1845, 65. *Mon. Helic.* i. 73; iii. 117. n. 554.

*Chemn.* ed 2, *Helix*, n. 168. t. 31. f. 3. 4.

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*Nanina* (Hemiplecta) *labiata*, *Albres, Heliceen*, 61.

Var. Uniform whitish, front side fulvous or white with a single chestnut band.

*Hab.* Landour, East Indies.

(1225) *Nanina splendens*,

Shell discoidal, purple-brown, polished, faintly striated concentrically and radiately, radiating striæ remote, the others very closely placed; spire scarcely elevated; whorls seven (omitting the apex), closely convoluted; aperture lunate; lip furnished with a distant, internal, thickened ridge. Lat. 0.65 poll.

*Nanina splendens*, *Hutton, Journ. As. Soc.* vii. pt. 1. 215.

*Pfr. Mon. Helic.* i. 73.

*Hab.* Mahassu, Himalaya.

b. *Ceylon*.

(1226) *Nanina semidecussata*.

Shell perforate, conoidal, solid, striated, decussated with spiral striæ, which are most distinct above, opaque, uniformly reddish-brown; spire conoidal, rather pointed; whorls seven, very little convex, the last one keeled, not descending, convex, striate beneath, with the spiral lines obsolete; aperture diagonal, lunate, angulate; peristome simple, straight, blunt, with the columellar margin very shortly reflected above. Height 13, greatest breadth 33, least breadth 30 mill. (*Pfr.*)

*Helix semidecussata*, *Pfr. in Proc. Zool. Soc.* 1851, p.; *Id.* n. 955. t. 145. f. 8, 9; *Mon. Suppl.* 53.

*Reeve*, n. 567. t. 102.

*Hab.* Island of Ceylon.

This shell is very nearly allied to *H. inversicolor*, *Fer.* but it differs from it by its being perforate, and the spire more raised.

(1227) *Nanina Emiliana*.

Shell perforate, conoidally lenticular, rather solid, sculptured above with crowded oblique ribs, rather regularly granulated by impressed spiral lines, opaque, yellowish-brown; spire conoidal, with the outlines slightly concave, with the apex raised, rather blunt; whorls six, moderately convex, enlarging slowly, last not descending, compressedly keeled convex beneath and radiately striate, slightly shining; aperture oblique, angularly lunate; peristome simple, straight, with the columellar margin shortly reflected near the perforation. Height 8, greatest breadth 16½, least breadth 15 mill. (*Pfr.*)

*Helix Emiliana*, *Pfr. in Proc. Zool. Soc.* 1852, p.; *Id.* n. 1075, t. 158 f. 33-35; *Mon. Suppl.* 55.

*Reeve*, n. 608. t. 108.

*Hab.* Ceylon.

(1228) *Nanina Juliana*.

Shell openly perforated, depressedly-turbinated, apex obtuse, solid, ponderous, smooth, striated, white, whorls five, slightly con-

# MOLLUSCA.

at the suture, ornamented with a chestnut band at the margin shaded downwards, nearly level beneath, impressed in the middle, umbilical area brown; aperture obliquely lunar; peristome simple, obtuse, basal margin slightly thickened. Lat. maj. 43, min. 36, alt. 25 mill.

*Nanina Juliana*, *Gray. Proc. Zool. Soc.* 1834 58.

*Muller, Synops.* 5.

*Beck, Ind.* 4. n. 11.

*Alb.* 61 (*Ryssota*).

*Helix rosacea*, *Sow. in Beech. Voy.* 143 t. 38. f. 2.

*Helix Dufourii*, *Grat. in Act. Bord.* xi. 407. t. 1. f. 2.

*Helix citrinoides*, *Grat. ibid.* 161.

*Helix commendabilis*, *Fer. Pr.* 235 (*Grat.*)

*Helix Juliana*, *Chemn. ed. 2, Helix*, n. 180. t. 33. f. 15—17.

*Pfr. Mon. Helix.* i. 44; *Id.* i. 211.

*Fer. Hist.* t. 88. f. 1.?

*Reeve*, n. 373. t. 72.

*Hab.* Ceylon.

(1229) *Nanina Gardeneri*.

Shell subperforated, turbinated, solid, decussated with longitudinal and more distant spiral striæ, bright chestnut; spire elevated, rather acute; whorls six and a half, slightly convex, the last larger, nearly smooth, ornamented at the margins with a white zone; aperture obliquely lunar, white inside; peristome simple, straight, columellar margin slightly thickened, rather dilated above, nearly closing the perforation. Lat. maj. 22, min. 19, alt. 15 mill.

*Helix Gardeneri*, *Pfr. in Proc. Zool. Soc.* 1847, 229; *Mon. Helic.* i. 47.

*Chemn. ed. 2, Helix*, n. 703. t. 112. f. 12, 13

*Reeve*, n. 446. 83.

*Hab.* Ceylon.

(1230) *Nanina Layardi*.

Shell perforate, turbinate, rather thin, covered with wrinkled striæ, scarcely shining, pellucid, pale horn-coloured; spire conoidal, with the apex rather pointed; whorls five and a half, moderately convex, the last one keeled, not descending, convex beneath; aperture little oblique, rounded-lunate, scarcely angular; peristome straight, thin, sharp, with the columellar margin very shortly reflected above. Height 9, greatest breadth 13, least breadth not quite 12 mill. (*Pfr.*)

*Helix Layardi*, *Pfr. in Proc. Zool. Soc.* 1851, p.; *Id.* n. 953. t. 145. f. 3, 4; *Mon. Suppl.* 55.

*Reeve*, n. 614. t. 109.

*Hab.* Ceylon (*Layard*).

(1231) *Nanina Chenui*.

Shell subperforate, depressed, rather thin, malleately-subdecussated with fine striæ and impressed spiral lines, chestnut-fulvous; spire scarcely elevated, obtuse; whorls four and a half, nearly level, slightly wrinkled-striate at the scarcely impressed suture, the last angulated, not



# MOLLUSCA.

of pale and chesnut, diluted below; aperture rather oblique, truncated-oval, opaline within; peristome straight, nearly simple, columellar margin slightly thickened, slightly dilated-reflected at the closed perforation. Lat. maj. 40, min. 34, alt. 20, mill.

*Helix Chenui*, *Pfr. in Zeitschr. f. Malak.* 1847, p. 145; *Mon. Helic.* ii. 438.

*Chemn.* ed. 2, *Helix*. n. 739, t. 119. f. 14-16.

*Reeve*, n. 370. t. 72.

*Hab.* Ceylon?

(1232) *Nanina Ceylanica*.

Shell perforate, subglobose-depressed, rather solid, diaphanous, scarcely shining, pale reddish horn-coloured, distinctly decussated and granulated above; whorls four and a half, little convex, the last surrounded in the middle with a white band, which is bordered on both sides, or only beneath, with a reddish-brown line; aperture middle-sized, oblique, roundish-lunate; peristome simple, straight, blunt; columellar margin rather thickened and slightly reflected above. Height 13, greatest breadth 26, least breadth 21, mill. (*Pfr.*)

*Helix Ceylanica*, *Pfr. in Z. f. M.* 1850, 67; *Id.* n. 795. t. 127. f. 6. 7; *Mon. Suppl.* 71.

*Reeve*, n. 411. t. 78.

*Helix bistrialis* *Pfr. Mon.* i. 71.

Larger, uniformly fulvid-yellow; height 17, greatest breadth 32½, least breadth 28 mill.

With the white peripheral band wanting, with a chestnut-coloured band in its place, and sometimes several reddish-brown lines.

*Hab.* Ceylon.

This species differs from *N. bistrialis* in the structure and sculpture of the shell, in the proportion of the whorls and of the aperture, &c.

(1233) *Nanina Woodiana*.

Shell depressed, thin, smooth, very shining, brownish horn-coloured; spire little raised, with the apex very minute; suture impressed; whorls six, scarcely convex, increasing slowly, the last one not descending anteriorly, depressed, slightly angulated, rather flat beneath; umbilicus narrow, open; aperture nearly perpendicular, lunate; peristome simple, straight, sharp, with the columellar margin scarcely reflected. Height 4½, greatest breadth 10, least breadth 9 mill. (*Pfr.*)

*Helix Woodiana*, *Pfr. in Proc. Zool. Soc.* 1851, p.; *Id.* n. 946. t. 144. f. 7. 8; *Mon. Suppl.* 87.

*Reeve*, n. 600. t. 107.

*Hab.* Ceylon (*Layard*).

*c. Singapore.*

(1234) *Nanina Lychnia*.

Shell imperforate, conic, much depressed, thin, translucent, polished, fuscous; spire conic, rather blunt; suture bordered; whorls six and a half, narrow, rather flat, the last scarcely broader, with a sharp compressed keel at its periphery, moderately convex beneath, excavated in the

# MOLLUSCA.

centre; aperture scarcely oblique, narrow, axe-shaped; peristome simple, sharp, with the lower margin arched, slightly thickened towards the umbilical region. Height 5½, greatest breadth not quite 12, least breadth 11 mill (*B.*)

*Helix Lychnia*, *Benson in Ann. & Mag. Nat. Hist.* 2nd ser. x. p.

*Reeve*, n. t.

*Pfr. Mon. Suppl.* 626.

*Hab.* Isle of Singapore (*Bacon*).

(1235) *Nanina naninoides*.

Shell perforate, orbiculate-convex, rather solid, pale fulvous, distinctly and closely striated above, often slightly decussated with obsolete concentric lines, nearly smooth beneath, distantly striatulate; spire depressedly conoidal, apex obtuse; whorls six, very slightly convex, the last rather angular, impressed in the middle; aperture transversely lunar; peristome straight, obtuse, rather thickened, very slightly reflected at the open perforation. Lat. maj. 25, min. 22, alt. 13 mill.

*Helix naninoides*, *Bens. Ann. Nat. Hist.* ix. 489.

*Phil. Icop.* ii. 9. 2. t. 6. f. 3.

*Chemn.* ed. 2, *Helix*. n. 158. t. 25. f. 7, 8.

*Pfr. Mon. Helic.* i. 70; *Id.* i. 193.

*Nanina* (*Xesta*) *naninoides*, *Alb.* 59.

*Hab.* Singapore; Chusan.

*d. China.*

(1236) *Nanina cinnamomea*.

Shell subperforated, depressed, thin, bright, diaphanous, very minutely and irregularly striated, cinnamon; suture moderate; whorls seven, narrow, scarcely convex; umbilicus small, half-covered; aperture rather oblique, semilunar; peristome simple, thin, acute. Lat. maj. 22, min. 20, alt. 11, mill.

*Helix cinnamomea*, *Val. in Mus. Paris.*

*Eydoux in Guérin Mag.* 1838, t. 116. f. 1.

*Reeve*, n. 442, t. 83.

*Pfr. Mon. Helic.* i. 54.

*Nanina* (*Xesta*) *cinnamomea*, *Alb.* 58.

*Hab.* Natunas Archipelago, Chinese Sea.

(1237) *Nanina Pfeifferi*.

Shell subperforate, orbiculate-convex, solid, smooth, bright, very finely plaited at the submarginate suture, chestnut-red, apex fulvous; spire slightly elevated; whorls six to six and a half, nearly level, the last rounded, subdepressed; aperture lunar, concolorous within; peristome simple, dextral margin sinuated, acute, basal slightly thickened, callous, columellar margin rather reflected. Lat. maj. 28, min. 25, alt. 16 mill.

*Helix Pfeifferi* (*Nanina* ?), *Phil. in Arch. f. Nat.* 1845, i. 62.

*Chemn.* ed. 2, *Helix*, n. 172. t. 31. f. 9, 10.

*Pfr. Mon. Helic.* i. 54, *Id.* i. 204.

*Desh. Helic.* 163. n. 217. t. 99. f. 1-3.

*Lister* t. 60 f. 572.

*Nanina* (Xesta) Pfeifferi, *Alb.* 59.

*Hab.* China.

(1238) *Nanina Redfieldi*.

Shell umbilicated, conoidally globose, thin, irregularly striated and very obsoletely decussated, diaphanous, shining, fulvid horn-coloured; spire conoidal, rather blunt; whorls five and a half, convex, enlarging regularly, the last inflated, not descending; aperture little oblique, lunate-roundish, higher than broad, pearly within; peristome simple, straight, sharp, with distant margins; columellar margin nearly perpendicular, dilated above, half covering the narrow umbilicus. Height 14, greatest breadth 17, least breadth 15 mill. (*Pfr.*)

*Helix Redfieldi*, *Pfr. in Proc. Zool. Soc.* 1852 p.; *Ik.* n. 1104. t. 161. f. 21, 22; *Mon. Suppl.* 80.

*Reeve*, n. 638. t. 118.

*Hab.* Shang Hi, China (*Fortune.*)

(1239) *Nanina epixantha*.

Shell depressed, faintly striated and very minutely granulated under a lens, shining, yellowish horn-colour; spire scarcely convex; apex blunt; suture impressed; whorls four, little convex, enlarging rapidly, the last not descending, more convex beneath; umbilicus narrow, forming about one-eighth of the total breadth, open; aperture scarcely oblique, roundish-lunate; peristome simple, straight; upper margin slightly depressed, columellar margin expanded into a triangular lamina. Height 8, greatest breadth 15, least breadth 13 mill. (*Pfr.*)

*Helix epixantha*, *Pfr. in Zeitschr f. Mal.* 1850, p. 70; *Ik.* n. 869. t. 134. f. 13-15; *Mon. Suppl.* 84.

*Reeve*, n. 454. t. 84.

*Hab.* Shang Hi, China. (*Fortune.*)

e. *Japan.*

(1240) *Nanina conospira*.

Shell openly perforate, globose conic, rather thin, faintly striated, little shining, pale horn-coloured; spire conic, with the outlines convex and the apex rather pointed; whorls five and a half, convex, the last rounded, not descending; aperture little oblique, nearly semicircular; peristome simple, straight, with distant margins; columellar margin somewhat dilated, expanded. Height 5, greatest breadth 6, least breadth 5½ mill. (*Pfr.*)

*Helix conospira*, *Pfr. in Z. f. M.* 1851, p. 14; *Ik.* n. 963. t. 146. f. 17, 18; *Mon. Suppl.* 50.

*Hab.* Japan.

(1241) *Nanina Sieboldiana*.

Shell scarcely perforate, globular, thin, horn-coloured, pellucid, slightly striate and very obsoletely decussate; spire short, conoidal, rather acuminate; whorls five and a half, moderately convex, the last one ventricose; aperture lunate-circular; peristome simple, sharp, with the columellar margin arcuate, dilated, convexly reflected.

Height 13, greatest breadth 18, least breadth 15½ mill. (*Pfr.*)

*Helix Sieboldiana*, *Pfr. in Z. f. M.* 1850, p. 87; *Mon. Suppl.* 42. *Reeve*, n. 495, t. 19.

*Helix ravida*, *Pfr. Mon.* i. 42. n. 69; *Ik.* i. 201, t. 13, f. 1, 2 (not *Benson*).

*Hab.* Japan (*Siebold*).

f. *Sumatra.*

(1242) *Nanina castanea*.

Shell perforated, subglobose, obscure, chestnut, with an adnate red and white band; whorls striated. Lat 17 lin.

*Helix castanea*, *Mull. Verm.* ii. 67. n-262.

*Chemn.* ix, pt. 2. 135. t. 131. f. 1177, 1178.

*Pfr. Mon. Helic.* i. 44.

*Nanina castanea*, *Beck. Ind.* 4.

*Hab.* Sumatra.

(1243) *Nanina convoluta*.

Shell orbiculate-depressed, thin, smooth, fragile, brownish horn-colored, with a single white peripheral band; spire moderately produce; whorls five, narrow, moderately convex, enlarging slowly, the last larger, broader, perforated beneath; aperture semilunate; peristome simple, sharp; columellar margin scarcely reflexed. Height 10, breadth 16 mill (*Desh*)

*Helix convoluta*, *Desh. in. Fer. Hist.* i. 401. n. 255 bis, t. 87. f. 2.

*Pfr. Mon. Suppl.* 48.

*Hab.* Sumatra.

(1244) *Nanina umbilicaria*.

Shell perforated, orbiculate-convex, solid, opaque bright, irregularly striated, white, ornamented with three unequal chestnut bands, one at the suture, two at the outline, basal area chestnut; whorls seven, scarcely convex, the last obsoletely angled; aperture oblique, wide, lunar; peristome simple, obtuse, basal margin slightly thickened; columellar margin dilated, reflected, not covering the perforation. Lat maj. 33, min. 28; alt. 17 mill.

*Helix umbilicaria*, *Le Guillon in Revue Zool.* 1842, p. 137.

*Chemn.* ed. 2, *Helix*, n. 63. t. 11. f. 14, 15.

*Pfr. Mon. Helic.* i. 64; *Ik.* i. 92.

*Nanina* (Xesta) *umbilicaria*, *Alb.* 59.

*Hab.* Sumatra.

g. *Java.*

(1245) *Nanina inquinata*.

Shell subperforate, conical-semiglobose, thin, nitidulous, minutely granulated, fawn-coloured; whorls five and a half, nearly level, the last sprinkled with brown spots and flamelets, obsoletely keeled, rounded in front; aperture subrhombic lunar; peristome simple, acute. Lat. maj. 28 min. 25, alt. 16 mill.

*Helix inquinata*, *V. d. Busch in Phil Icon.* i. 1. 10. t. 1. f. 4.

*Pfr. Symb.* ii. 19; *Mon. Helic.* i. 46; *Ik.* i. 202.

*Chemn.* ed. 2. *Helix*, n. 169. t. 31. f. 5, 6.

*Reeve*, n. 399. t. 76.



# MOLLUSCA.

*Nanina* (*Hemiplecta*) *inquinata*, *Alb.* 60.

*Hab.* Java.

(1246) *Nanina gemina*.

Shell very narrowly umbilicated, depressedly-turbinated, obsolete angulated, irregularly subgranular with concentric and oblique striae, brunnescens, beneath pale, lutescent, surrounded in the middle by a white band, adnate with a narrower rufous band; whorls six, rapidly increasing, scarcely convex; aperture lunate-oval; peristome simple, inflected above, Lat. maj. 49, min. 41, alt. 28 mill.

*Helix gemina*, *V. d. Busch in Phil. Icon.* i. 1. p. 9. t. 1. f. 1. (*Nanina*?)

*Pfr. Symb.* ii. 18; *Mon. Helic.* i. 43.

*Hab.* Java.

(1247) *Nanina halata*.

Shell scarcely perforate, conoidal, thin, smooth, diaphanous, bluish-green, uniform, or with two pale red bands; spire convex-conoidal, dusty, with the apex rather blunt; whorls six, moderately convex, the last one not descending, obtusely angulated in the middle, rounded anteriorly, convex and shining beneath; aperture oblique, lunate, somewhat trapezoidal; peristome simple, straight, sharp, with the margins distant from each other, columellar margin reflected above in a very small lamina. Height 19, greatest breadth 28, least breadth 25 mill. (*Pfr.*)

*Nanina halata*, *Mouss. Jav. Moll.* 112. t. 21. f. 2.

*Alb.* 60 (*Hemiplecta*).

*Helix halata*, *Reeve, Conch. Icon.* n. 486. t. 90.

*Pfr. Ic.* n. 929. t. 142. f. 9, 10; *Mon. Suppl.* 45.

*Hab.* Dampo, Java (*Zollinger*).

(1248) *Nanina bataviana*.

Shell perforated, depressedly-globose, thin, obtusely keeled, above cinnamon-coloured, obliquely closely costulated, chestnut beneath, striated, pale towards the umbilicus, umbilical area chestnut; whorls six and a half, very slightly convex; aperture angulately-lunar; peristome nearly simple, archedly reflected at the perforation. Lat. maj.  $33\frac{2}{3}$ , min. 29, alt.  $17\frac{1}{2}$  mill.

*Helix bataviana*, *V. d. Busch in Phil. Icon.* i. 1. p. 9. t. 1. f. 3.

*Pfr. Mon. Helic.* i. 77 (*Nania*?); *Symb.* ii. 17. *Ic.* i. 87.

*Chemn. ed. 2, Helix*, n. 58. t. 11. f. 1-3.

*Reeve*, n. 463. t. 86.

*Nanina bataviana*, *Mouss. Jav. Moll.* 17. t. 1. f. 1.

*Alb.* 60 (*Hemiplecta*).

*Hab.* Java.

(1249) *Nanina cincta*.

Shell depressed above, inflated beneath, longitudinally striated, umbilicated, red-brown, ornamented with a black or brown band above the middle of the whorls; whorls four; spire planulate; aperture somewhat rounded; lip simple; columella smooth. Lat. 23, alt. 15 mill.

*Helix cincta*, *Lea, Obs.* i. 168. t. 19. f. 62.

# MOLLUSCA.

*Pfr. Mon. Helic.* i. 54.

*Hab.* Java?

(1250) *Nanina javanica*.

Shell perforated, orbiculate-convex, closely costulate-striated above, nearly smooth beneath, lutescent-horny, zoned with three narrow red bands, two near the margin, the third near the suture; spire short; whorls six, nearly level, the last slightly keeled; keel vanishing in front; umbilical area red; aperture somewhat angularly lunar; peristome simple, straight; columellar margin a little dilated at the open perforation, slightly reflected. Lat. maj. 23, min. 23, alt. 15-16 mill.

*Helix javanica*, *Lam.* 40, p. 76; ed. *Dh.* p. 45.

*Chemn. ed. 2, Helix*, n. 62. t. 11. f. 12. 13.

*Pfr. Mon. Helic.* i. 64; *Ic.* i. 91.

*Desh. Hist. Hel.* 187. n. 250.

*Reeve*, n. 396. t. 76.

*Helix javacensis* (*Helicella*), *Fer. Pr.* 234; *Hist.* t. 92. f. 2.

*Nanina javanensis*, *Gray in Proc. Zool. Soc.* 1834, p. 59.

*Nanina Javana*, *Back, Ind.* 4.

*Nanina Javanica*, *Mouss. Jav. Moll.* 15. t. 1. f. 3.

*Alb.* 59 (*Xesta*).

*Hab.* Java.

(1251) *Nanina centralis*.

Shell perforate, conic, orbiculate, keeled, faintly striated above with excessively minute granulations, cinnamon-coloured; spire conic, with the outlines rectilinear; whorls five and a half, flattened above the last pale in the region of the keel, convex and shining beneath, obscurely cinnamon-coloured round the perforation; aperture obliquely subtrapezoid; peristome simple, inflected round the perforation. Height 12, greatest breadth 22, least breadth 20 mill. (*Mouss.*)

*Nanina centralis*, *Mousson, Jav. Moll.* 17. t. 2. f. 1.

*Alb.* 60 (*Hemiplecta*).

*Helix centralis*, *Pfr. Mon. Suppl.* 78.

*Hab.* Javal (*Zollinger*).

(1252) *Nanina ryssolemma*.

Shell sinistral, orbicular, solid, opaque, yellowish-fusces above, sculptured with serial coarse impressions, paler beneath, nearly smooth, whitish in the umbilical region; spire scarcely raised, very blunt; whorls five and a half, flattened, the last angled, but rounded towards the aperture, ventricose beneath, slightly descending towards the umbilicus, which is wide and deep; aperture very oblique, roundish-lunate, pearly within, with a fuscous edge; peristome straight, sharp, with the margins joined by a rather thick callus; columellar margin rectilinear, produced above into a triangular lamina. Height 19, greatest breadth 40, least breadth 33 mill. (*Alb.*)

*Nanina ryssolemma*, *Albers in Z. f. M.* 1852, p. 26.

## MOLLUSCA.

*Helix ryssolemma*, *Pfr. Mon. Suppl.* 634.  
*Hab.* Java?

*h. Philippine Islands.*

(1253) *Nanina gradata*.

Shell imperforate, globose-turbinated, striatulate, thin, hyaline; spire turbinated, apex acute; whorls six, slightly convex, graduated, the last acutely keeled in the middle, convex beneath, under a lens very minutely striated concentrically; aperture squarish-lunar; peristome simple, acute, columellar margin slightly and vertically descending. Lat. maj. 5, min.  $4\frac{2}{3}$ , alt. 5 mill.

*Helix scalarina*, *Pfr. Proc. Zool. Soc.* 1846, p. 110; in *Z. f. M.* 1851, p. 128.

*Helix gradata*, *Pfr. Mon.* i. 38. n. 60 (not *Gould*).

*Reeve*, n. 165. t. 37.

*Hab.* Leyte, Philippines.

(1254) *Nanina fulvida*.

Shell subperforated, globosely-turbinated, thin pellucid, pale fulvescent, very closely granulose above (under a lens), glabrous beneath, bright; spire elate, apex obtuse; whorls five and a half, the highest plane, the last one and a half rounded; aperture lunar; peristome simple; columellar margin slightly thickened, reflected at the obsolete perforation. Lat. maj. 31, min.  $27\frac{1}{2}$ , alt. 22 mill.

*Helix fulvida*, *Pfr. Proc. Zool. Soc.* 1842, p. 87.

*Phil. Icon*, i. 2. p. 21. t. 2. f. 2.

*Chemn. ed.* 2, *Helix*, n. 171. t. 31. f. 11, 12.

*Helix fulvida* (*Nanina* ?), *Pfr. Symb.* ii. 18; *Mon. Helic.* i. 45; *Id.* i. 204.

*Reeve, Conch. Icon.* n. 29. t. 7.

*Nanina* (*Hemiplecta*) *fulvida*, *Alb.* 60.

*Hab.* Mindanao, Philippines.

(1255) *Nanina conoidalis*.

Shell orbiculate-conoidal, with the perforation almost covered, elevated above, convex, beneath, with radiating striæ, pale brownish; whorls five, bordered above, reticulate-striated or wrinkled, reddish-brown violaceous, the last with a narrow band of chestnut-colour; peristome simple imperceptibly thickened. Height 21, greatest breadth 32 mill. (*Adams and Reeve*.)

*Helix conoidalis*, *A. Adams and Reeve, Voy. Samarang, Moll.* 63. t. 16. f. 11.

*Reeve, Conch. Icon.* n. 523. t. 96.

*Pfr. Mon. Suppl.* 46.

*Hab.* Isle of Mindoro.

(1256) *Nanina spectabilis*.

Shell subperforated, turbinately-depressed, solid, very bright, horny luteous, ornamented with one percurrent red or blackish band; spire more or less elevated, apex often reddish; whorls five and a half, slightly convex, the last angulated beneath the band; aperture widely lunar; peristome simple, acute; columellar margin slightly reflected, covering the perforation. Lat. maj. 17, min. 15, alt. 10 mill.

## MOLLUSCA.

*Helix spectabilis*, *Pfr. Proc. Zool. Soc.* 1845, p. 14.

*Phil. Icon.* i. 7, p. 155, t. 4, f. 13.

*Chemn. ed.* 2, *Helix*, n. 165, t. 32. f. 3, 4.

*Pfr. Mon. Helic.* i. 47; *Id.* i. 199.

*Desh. l. c.* 164. n. 219 t. 97. f. 11-13.

*Reeve*, n. 148. t. 34

*Helix spectabilis*, var., *Chemn. ed.* 2, *Helix*, t. 32. f. 5, 6.

*Nanina* (*Microcystis*) *spectabilis*, *Alb.* 60.

Var. *Vitrina fusco-succinea*, *Beck, MSS.*

*Hab.* Samar, Philippines.

(1257) *Nanina gemma*.

Shell scarcely perforate, conoidally orbicular, thin, smooth, shining, pellucid, greenish-glassy; spire depressed conoidal; suture slightly bordered; whorls four, very little convex, enlarging regularly, the last not descending anteriorly; aperture little oblique, roundish-lunate; peristome simple, straight; columellar margin short, arched, a little reflected above. Height 5, greatest breadth 9, least breadth 7 mill. (*Pfr.*)

*Helix gemma*, *Pfr. in Proc. Zool. Soc.* 1848, p. 109; *Z. f. M.* 1848, p. 90; *Id.* n. 762. t. 122. f. 19, 20 *Mon. Suppl.* 49.

*Reeve*, n. 168. t. 37.

*Vitrina suturalis a*, *Beck, M.S.S.*

Smaller, whitish-glassy, with the spire less elevated.—*Pfr, Id.* t. 122. f. 21.

*Vitrina suturalis Beck, MSS.*

*Microcystis margarita, Beck, MSS.*

*Morch, Cat. Yold.* 2. n. 30.

*Hab.* Albulug, island of Zugon; var. from Camiguin (*H. Cuming*.)

This shell differs from *H. glauca* by its spire less elevated, and by the more slowly increasing whorls, the last one being narrower.

(1258) *Nanina maxima*

Shell perforated, depressed, slightly turbinated, solid, heavy, obliquely and irregularly striated, fulvous above, marked with broader and narrower yellow bands; spire subturbinate with the apex rather blunt; suture deep; whorls six and a half, enlarging slowly, the upper ones flat, the following regularly vaulted, the last keeled at its periphery, moderately convex, shining, chestnut-coloured beneath; aperture little oblique, lunate, milky-white within; peristome simple, straight, blunt, with distant margins; basal margin somewhat thickened within, shortly dilated above and almost covering the perforation. Height 42, greatest breadth 90, least breadth 77 mill. (*Pfr.*)

*Helix maxima*, *Pfr. in Proc. Zool. Soc.* 1853, p.; *Mon. Suppl.* 627.

*Hab.* Philippine Islands.

(1259) *Nanina Oweniana*.

Shell perforated, turbinately depressed, thin, radiatingly striated above and decussated with extremely crowded spiral striæ, not shining, fulvous; spire shortly conoidal, blunt; suture bordered; whorls four and a half, enlarging gradually,



convex, the last not descending, with a pale keel at its periphery and a rufous band below the keel, horny-greenish and shining beneath, with irregularly impressed spiral lines; aperture nearly diagonal, lunate, rather rhomboidal, pearly within; peristome simple, straight, with distant margins; columellar margin declivous, callous, sinuated above, shortly dilated and reflexed near the perforation. Height 17, greatest breadth 32, least breadth  $26\frac{1}{2}$  mill. (*Pfr.*)

*Helix Oweniana*, *Pfr. in Proc. Zool. Soc.* 1853, p. ; *Mon. Suppl.* 628.

*Hab.* Philippine Islands.

(1260) *Nanina Armida*.

Shell subperforate, rather turbinated, thin, faintly and minutely striated, diaphanous, slightly shining, fulvous horn-coloured, spire convexly conoidal, with a subtle and rather blunt apex; suture impressed, bordered with white; whorls six, moderately convex, enlarging gradually, the last not descending, furnished with a short, sharp white keel, more convex beneath; aperture nearly perpendicular, lunate, slightly angled; peristome simple, straight, with distant margins; columellar margin declivous, slightly thickened above. Height 8, greatest breadth 16, least breadth 14 mill. (*Pfr.*)

*Helix Armida*, *Pfr. in Z. f. M.* 1853, p. 53; *Mon. Suppl.* 628.

*Hab.* Mount Isarog, Isle of Luzon (*H. Cuming*)

(1261) *Nanina ceratodes*.

Shell subperforated, globosely-depressed, thin, minutely striatulate, nitidulous, pellucid, horny; spire scarcely elevated; whorls five, subplanulate, increasing rapidly, the last subdepressed; aperture ample, obliquely lunar; peristome simple, acute; columellar margin very slightly reflected, nearly hiding the perforation. Lat. maj.  $16\frac{1}{2}$ , min. 14, alt. 9 mill.

*Helix ceratodes*, *Pfr. in Proc. Zool. Soc.* 1845, p. 128.

*Chemn. ed. 2. Helix.* n. 690. t. 110. f. 16, 17. *Pfr. Mon. Helic.* i. 57.

*Reeve*, n. 150. t. 34 f. 147-150.

*Vitrina centralis*, *Beck. MSS.*

*Hab.* Luzon and Mindoro, Philippines.

(1262) *Nanina succinea*.

Shell depressed, obsoletely perforated, thin, pellucid, bright, amber-like; suture moderate, slightly margined; whorls five, increasing rapidly, very slightly convex; aperture lunar; peristome simple, acute; columellar margin slightly reflected, covering the obsolete perforation. Lat. maj. 10, min.  $8\frac{1}{2}$ , alt. 6 mill.

*Helix succinea*, *Pfr. in Proc. Zool. Soc.* 1845, p. 39.

*Chemn. ed. 2. Helix*, n. 541. t. 87. f. 6-8.

*Pfr. Mon. Helic.* i. 58.

*Reeve*, n. 161. t. 36.

*Nanina (Microcystis) succinea*, *Alb.* 60.

*Hab.* Luzon and Mindoro, Philippines.

(1263) *Nanina subfusca*.

Shell subperforate, depressed, thin, minutely striated, pellucid, brownish horn-coloured; spire scarcely raised; suture slight, somewhat bordered whorls four and a half, scarcely convex, enlarging rapidly, the last rounded at its periphery, not descending anteriorly; aperture a little oblique, broadly lunate; peristome simple, thin, straight, with convergent margins; right margin rather sinuate, columellar margin nearly perpendicular, scarcely reflected above. Height  $6\frac{1}{2}$ , greatest breadth  $11\frac{1}{2}$ , least breadth 10 mill. (*Pfr.*)

*Vitrina subfusca*, *Beck in Muss. Cuming.*

*Helix subfusca*, *Pfr. in Proc. Zool. Soc.* 1848, p. 109; *Z. f. M.* 1848, p. 91; *Ik. n.* 761. t. 122. f. 16-18; *Mon. Suppl.* 62.

*Hab.* Isle of Luzon (*H. Cuming*).

(1264) *Nanina lucidella*.

Shell minute, perforated, depressed, striatulate, very bright, brunnaceous; spire subplanulate; suture white-margined; whorls four, level, the last scarcely more convex beneath, impressed in the middle, very narrowly perforated; aperture obliquely lunar; peristome simple, obtuse; columellar margin steep, scarcely thickened. Lat. maj.  $3\frac{2}{3}$ , min. 3, alt. 2 mill.

*Helix lucidella*, *Pfr. Proc. Zool. Soc.* 1846, p. 41; *Mon. Helic.* i. 60.

*Reeve, Conch. Icon.* n. 164, t. 37.

*Hab.* Luzon, Philippines.

(1265) *Nanina sagittifera*.

Shell subperforated, depressed, thin, pellucid, obliquely striated and obsoletely wrinkled, fulvous, ornamented with arrow-shaped spots, and a single obsolete red band at the keel; suture impressed, slightly channeled at the last whorl; whorls four and a half, nearly level, the last inflated; aperture very oblique, lunate-oval, milky inside; peristome simple, slightly thickened at the columella, scarcely reflected, upper margin deflected. Lat. maj. 47, min. 38, alt. 26 mill.

*Helix sagittifera*, *Pfr. in Proc. Zool. Soc.* 1842, p. 86. *Mon. Helic.* i. 62; *Ik.* i. 197.

*Phill. Icon.* i. 4. p. 77. t. 4. f. 1.

(*Nanina?*) *Pfr. Symb.* ii. 20.

*Chemn. ed. 2. Helix*, n. 163. t. 32. f. 10. II.

*Desh. l. c.* 159. n. 211. t. 99. f. 15-19.

*Reeve*, n. 3. t. 1, and var.

*Helix hepatica*, *Reeve*, n. 9. t. 3.

*Nanina (Ryssota) sagittifera*, *Alb.* 61.

*Hab.* Philippines.

(1266) *Nanina Borneensis*.

Shell obliquely perforate, depressed, rather thin, decussated by distinct striae of growth and numerous oblique impressed lines, dark fulvous; spire scarcely raised, blunt; suture bordered with an impressed line; whorls four, little convex, increasing rapidly, the last one marked at the periphery with a blackish band, which is dilute towards the centre; more convex beneath and irregularly radiated with chestnut streaks; aperture oblique, large, transversely lunate-oval, nearly

within, with the band translucent; peristome simple, sharp, with the columellar margin reflected into a short triangular lamina, which covers half the umbilicus. Height 25, greatest breadth 52, least breadth 42 mill. (*Pfr.*)

*Helix Borneensis*, *Pfr.* in *Proc. Zool. Soc.* 1849 p. 127; *Mon. Suppl.* 70.

*Hab.* Borneo.

This species in shape, size and habitus greatly resembles *N. sagittifera*; but its sculpture is different, its spire less raised, its whorls increasing rather slowly, and its aperture is larger and more oval.

(1267) *Nanina ovum*.

Shell slightly perforated, globosely, depressed obliquely striated and irregularly wrinkled, slightly decussated with impressed lines, very close at the apex, remote and irregular on the last whorls, obtusely keeled, entirely deep fulvous, or ornamented with a pale band above the keel, and a purplish-black band beneath the keel; suture channeled; whorls five, tumid above, the last excavated at the columella: aperture lunate-elliptical, inside bright, milky; peristome simple, thick, dextral margin archedly dilated. Lat. maj. 115, min 80, alt 70 mill.

*Helix ovum*, *Val.* in *Humb. Voy Zool.* ii. 240 t. 57. f. 1.

*Fer.* in *Bull. Zool.* 1835, p. 32.

(*Nanina?*) *Pfr. Symb.* ii. 19.

*Chemn.* ed. 2. *Helix*, n. 155. t. 25. f. 1. 2.

*Pfr. Mon. Helic.* i. 6<sup>r</sup>. *Ik.* i. 190.

*Desh.* in *Fer.* i. 155. n. 207.

*Reeve*, n. 1. t. 1. f. 1. 2. 4.

*Nanina* (*Ryssota*) *ovum*, *Alb.* 61.

*Helix meridionalis*, *Gray* in *Wood, Suppl.* t. 7. f. 42. (not *Risso*).

*Helix* (*Helicogena*), *otaheitana*, *Fer. Pr.* 49; *Hist.* t. 29. f. 4. 5.

*Eurycratera otaheitana*, *Beck Ind* 46.

*Chromocochlea tahitana*, *Hartm. Erd-u Sissu Gart.* i. 186. t. 65. 66.

*Hab.* Philippines.

(1268) *Nanina nobilis*.

Shell narrowly umbilicate, depressed, rather turbinate, solid, striated, slightly decussated with impressed spiral and oblique lines, fulvous; spire little raised, shortly turbinate; whorls six, scarcely convex, the last surrounded in the middle with a raised, blunt ridge, below which is a dark chestnut-coloured band, which is diffuse and vanishes towards the umbilicus; aperture large, little oblique, broadly lunate, pearly within; peristome simple, straight; columellar margin reflected into a short triangular lamina near the umbilicus. Height 30, greatest breadth 53, least breadth 45 mill. (*Pfr.*)

*Helix nobilis*, *Pfr.* in *Proc. Zool. Soc.* 1849, p. 127; *Ik.* n. 771. t. 125. f. 1. 2.; *Mon. Suppl.* 69.

Whitish, with a single narrow peripheric band, beneath which the last whorl is of a pale violaceous colour.

*Helix obliquata*, *Reeve, Conch. Icon.* n. 384 t. 74.

*Hab.* Borneo; the variety from the Philippine Islands (?).

(1269) *Nanina Mulleri*.

Shell obteetly perforated, convexly orbiculate, slightly keeled, solid, fulvous, darker beneath, marked with a broad red band beneath the keel; suture linear; whorls four and a half, rapidly increasing, the highest plane, minutely rugulose, reticulated, the last convex towards the aperture irregularly malleately rugose; aperture lunate-oval; peristome simple, upper margin slightly inflected, columellar a little expanded, covering the perforation. Lat. maj. 39 min. 33, alt 23 mill.

*Helix Mulleri*, *Pfr.* in *Zeitschr. f. Mal.* 1844, p. 178; *Mon.*

*Helic.* i. 67; *Ik.* 191.

*Chemn.* ed. 2. *Helix*, n. 156 t. 25. f. 3, 4.

*Desh.* in *Fer.* 100. n. 213, t. 100. f. 11-13.

*Reeve*, n. 19. t. 4.

*Nanina* (*Ryssota*) *Mulleri*, *Alb.* 61.

*Helix ovum* *Pfr. Symb.* ii. 20.

*Hab.* Philippines.

(1270) *Nanina bulla*.

Shell subperforate, globosely-depressed, very thin, pellucid, very minutely decussated with close spiral and oblique striae, slightly keeled, pale fulvous, red-zoned at the keel; suture scarcely impressed; spire hardly exerted; whorls four, nearly level; aperture lunate-rounded, iridescent inside, one-banded; peristome simple, upper margin bent inwards, columellar scarcely expanded. Lat. maj. 40 min 31, alt. 23 mill.

*Helix bulla*, *Pfr.* in *Proc. Zool. Soc.* 1842, p. 151; *Mon. Helic.* i. 68; *Ik.* i. 207.

*Phill. Icon.* i. 4. p. 77. t. 4 f. 2.

*Chemn.* ed. 2. *Helix*, n. 175. t. 33. f. 3. 4.

*Desh. Helic.* 161. n. 214. t. 100. f. 6, 7.

*Reeve*, n. 15. t. 4.

*Nanina* (*Hemiplecta*) *bulla*, *Alb.* 60.

*Helix vesica* (*Nanina?*), *Pfr. Symb.* ii. 21. (not *Lea*).

*Hab.* Philippines.

(1271) *Nanina gummata*.

Shell slightly perforated, conical, somewhat depressed, minutely decussated above with longitudinal and transverse striae; brown, dull; clothed with a gummy epidermis; smooth beneath, very bright, yellowish-brown, zoned at the margin with a broad luteous band, adnate, with a broader rufous band beneath; whorls six and a half, convex, narrow; aperture wide, lunar; peristome simple; columellar margin thickened, reflected, nearly covering the perforation.

*Helix gummata*, *Sow. Proc. Zool. Soc.* 1841, p. 25.

*Pfr. Symb.* ii. 18; *Mon. Helic.* i. 73; *Ik.* i. 216.



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*Chemn.* ed. 2, *Helix*, n. 184 t. 34. f. 1. 2.

*Reeve*, n. 134. t. 31.

*Nanina* (*Hemiplecta*), *gummata*, *Alb.* 60.

*Helix luteofasciata*, *Lea*, *Philad. Trans.* 1841, p. 462. t. 12. f. 13.

*Hab.* Luzon.

(1272) *Nanina xanthotricha*.

Shell obiectly subperforate, rather depressed, cinnamon, regularly and minutely granulated above and beyond the margin, clothed with a silky epidermis; hairs close, short, golden; suture deep; whorls six, rounded, the last glabrous beneath; shining, the smooth part separated from the granular by a slight angle; aperture wide, lunar, milky inside, brown-margined; peristome simple, acute, columellar margin much thickened. Lat. maj. 31, min 28, alt 18 mill.

*Helix xanthotricha*, *Pfr. Symb.* ii. 21; *Mon. Helic.* i. 74;  *Ic.* i. 217.

*Chemn.* ed. 2, *Helix*, n. 186. t. 34. f. 16, 17.

*Desh. Helic.* 163. n. 218. t. 99, f. 4-8.

*Reeve*, t. 31. f. 132. b. c.

*Nanina* (*Hemiplecta*) *xanthotricha*, *Alb.* 60.

*Helix velutina*, *Sow. Proc. Zool. Soc.* 1841, p. 25 (not *Lam.*)

*Hab.* Guimaras.

(1273) *Nanina Morchii*.

Shell perforate, rather depressed, thin, very minutely decussated and granulated, covered with very short bristles, pale horn-coloured, with a reddish-brown peripheral line, and with a chestnut-coloured band beneath; spire short, convex, with the apex prominent; whorls five, moderately convex, the last obsoletely angled at its periphery, smooth and shining round the perforation and a little beyond the basal band, the smooth part touching the granulated part without forming an angle; aperture nearly vertical, roundish-lunate, pearly within, with the bands translucent; peristome simple sharp; columellar margin very slightly reflected above. Height 12, greatest breadth 20, least breadth 18 mill (*Pfr*)

*Helix xanthotricha*, *Pfr. Mon.* i. 74;  *Ic.* t. 34, f. 18, 19.

*Reeve*, t. 31. f. 132 a.

*Helix spec. nova?* *Morch*, *Cat. Kierulf.* 1. n. 3.

*Helix Morchii*, *Pfr in Z. f. M.* 1851, p. 12; *Mon. Suppl.* 73.

*Hab.* Negros, Philippines (*U. Cuming*).

(1274) *Nanina setigera*.

Shell obiectly subperforate, somewhat semiglobose, thin, brunneous, upper surface and exterior of the base slightly granulated, clothed with a setigerous epidermis, beneath smooth and shining, with a broad luteous band beneath the margin and around the umbilicus; spire depressedly conoidal; whorls six, convex; aperture rounded lunar; peristome simple, columellar

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margin thickened. Lat. maj. 30, min. 27, alt. 20 mill.

*Helix setigera*, *Sow. Proc. Zool. Soc.* 1841, p. 25.

*Pfr. Symb.* ii. 21; *Mon. Helic.* i. 74;  *Ic.* i. 218.

*Delessert*, *Recueil*, t. 38. f. 5.

*Chemn.* ed. 2, *Helix*, n. 187. t. 34. f. 20. 21.

*Chenu*, *Ill. Conch.* t. 25. f. 5.

*Reeve*, n. 135. t. 31.

*Nanina* (*Hemiplecta*) *setigera*, *Alb.* 60.

*Hab.* Luzon.

(1275) *Nanina Zeus*.

Shell obliquely perforated, somewhat depressedly-convex, solid, sculptured with oblique wrinkles and raised spiral lines, rufous, ornamented above with white flashing stripes; whorls four and a half, convex, the last convex beneath, angulated in the middle, forrowed beneath the keel with deep, concentric grooves; aperture very oblique, subtrapezoidal, iridescent within; peristome acute, straight; columellar margin short, reflected over the perforation. Lat. maj. 60, min. 47, alt. 30 mill.

*Helix Zeus*, *Jonas in Proc. Zool. Soc.* 1842, p. 188.

*Phil. Icon.* i. 3. p. 47. t. 3. f. 1.

*Chemn.* ed. 2, *Helix*, n. 160. t. 26. f. 4-6.

*Fer. Hist.* t. 64 A. f. 9.

*Pfr. Mon. Helic.* 67;  *Ic.* i. 195.

*Desh. Helic.* 155. n. 208. t. 64 A. f. 9; t. 100. f. 1, 2.

*Reeve*, n. 17. t. 4.

*Nanina* (*Ryssota*) *Zeus*, *Alb.* 62.

Smaller, with the umbilicus quite closed. Height 22, breadth 43 mill.

*Hab.* Philippines.

(1276) *Nanina Lamarckiana*.

Shell obliquely perforated, depressed, slightly keeled, thin, irregularly striated and wrinkled, olivaceous-red, ornamented below the keel with a blackish-rufous band, shaded off below; suture impressed; spire scarcely elevated; whorls four and a half, the highest nearly level, very minutely decussated; aperture widely elliptical, milky or opaline inside; peristome simple, thin, dilated at the columella, reflected, half covering the oblique umbilicus. Lat. maj. 60, min. 48, alt. 32 mill.

*Helix Lamarckiana*, *Lea in Tr. Am. Phil. Soc.* vii. 461, t. 12. f. 11.

*Chemn.* ed. 2. *Helix*, n. 159, t. 26. f. 1-3.

*Pfr. Symb.* ii. 19; *Mon. Helic.* i. 67;  *Ic.* i. 194.

*Helix Lamarckiana*, *Desh. Helic.* 158. n. 210. t. 102. f. 1-3.

*Reeve*, n. 20. t. 4.

*Nanina* (*Ryssota*) *Lamarckiana*, *Alb.* 62.

Smaller, paler, thinner, more distinctly keeled. Height 24, greatest breadth 55, least breadth 43 mill.

*Helix caducior*, *Reeve, Conch. Icon.* n. 12. t. 3.

*Hab.* Philippines (*Cuming*).

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# MOLLUSCA.

## (1277) *Nanina semiglobosa*.

Shell subperforated, semiglobose, thin, lutescent horny, very minutely granulated above; suture scarcely impressed; whorls six, plane, the last keeled, beneath the keel smooth, shining, marked with a pale brown band; aperture lunate-elliptical, banded inside; peristome simple, acute; columellar margin widely reflected, half covering the very narrow umbilicus. Lat. maj. 44, min. 39, alt. 26 mill.

*Helix semiglobosa*, *Pfr. Proc. Zool. Soc.* 1845, p. 38; *Mon. Helic.* i. 75.

*Reeve*, n. 118 t. 27.

Smaller, with five whorls, of which the last is rather convex above, Height 15, greatest breadth 30, least breadth 27 mill.

*Hab.* Philippines.

## (1278) *Nanina porphyria*.

Shell perforated, depressed, solid, rugosely striated obliquely, rufous, marbled with very numerous subprominent pale yellow spots and stripes, keeled, below the keel brown-banded, beneath olive-fulvous, brighter; whorls four and a half, planulate, regularly increasing, the last openly channeled round the perforation; aperture subrhombic; peristome simple, thin, columellar margin archedly reflected. Lat. maj. 43, min. 38, alt. 26 mill.

*Helix porphyria*, *Pfr. Proc. Zool. Soc.* 1842 p. 37.

(*Nanina*?) *Pfr. Symb.* ii. 20; *Mon. Helic.* i. 76; *Id.* i. 198.

*Phil. Icon.* i. 2 p. 22. t. 2. f. 3.

*Chemn. ed. 2. Helix.* n. 164. t. 32. f. 12. 13.

*Desh. Helic.* 157. n. 209. t. 100. f. 8-10.

*Reeve*, n. 8. t. 3.

*Nanina* (*Ryssota*) *porphyrea*, *Alb.* 62.

*Hab.* Philippines.

## (1279) *Nanina Darondeani*.

Shell orbicular, umbilicated, keeled, depressedly-convex above, pale olive-brown, beneath convex, chestnut; whorls five, obliquely wrinkled, finely and closely transversely striated; aperture rounded-oval, concave towards the narrow umbilicus, brown inside, white-banded; peristome acute; columella white, widely reflected above the umbilicus; umbilicus moderate, deep, depressed at the margin. Lat. 41, alt. 19 mill.

*Helix Darondeani*, *Soul. Reeve Zool.* 1842, p. 101.

*Pfr. Mon. Helic.* i. 76; *Voy de la Bonite Moll.* t. 28. f. 21-23.

*Hab.* Luzon, Philippines.

## (1280) *Nanina Cuvieriana*.

Shell openly perforated, orbiculate, thin, pellucid, obliquely striated, keeled, olivaceous-lutescent, ornamented with a broad rufous band beneath keel, shaded off downwards; spire scarcely elate; whorls five, planulate, the last convex beneath; aperture wide, lunar; peristome simple, acute, columellar margin very slightly reflected.

*Helix Cuvieriana*, *Lea. Trans. Am. Phil. Soc.* vii. 461, t. 12, f. 12.

(*Nanina*?) *Pfr. Symb.* ii. 18; *Mon. Helic.* i. 77; *Id.* i. 196.

*Chemn. ed. 2, Helix*, n. 161, t. 26, f. 7-9.

*Reeve*, n. 28, t. 7.

*Nanina* (*Hemiplecta*) *Cuvieriana*, *Alb.* 60.

*Hab.* Luzon, Philippines.

## (1281) *Nanina exilis*.

Shell perforated, nearly discoidal, keeled, pellucid, thin, pale fulvous, depressed above, sharply striated, more convex beneath, and with less distinct striæ; whorls six, nearly level, the last not descending, ornamented beneath the keel with a narrow rufous band; umbilical area sometimes reddish-brown; aperture wide, elliptical; peristome simple, acute, columellar margin very slightly reflected. Lat. Maj. 35, min. 30, alt. 15 mill.

*Helix exilis*, *Mull. Verm.* ii. 22, n. 221.

*Pfr. Mon. Helic.* i. 78; *Id.* n. 887. t. 137. f. 10-12.

*Desh. Helic.* 364. n. 431. t. 64. A. f. 1.

*Reeve*, n. 16. t. 4.

*Helix explanata*, *Quoy. & Gaimard, Astrol. Zool.* ii. 123. t. 10. f. 10-13!

*Lam. ed. Desh.* 194. p. 121.

*Fer. Hist.* t. 64. A. f. 1?

*Nanina exilis*, *Beck. Ind.* 4.

*Gray, Proc. Zool. Soc.* 1834. p. 59?

*Hab.* New Guinea; Philippines.

## (1282) *Nanina biangulata*.

Shell subperforated, scalariform, thin, horny-rubelline, faintly striated, rather shining; whorls seven, gradually increasing, the last bicarinate; lower keel thread-like at the margin, the higher passing through all the whorls; aperture lunate-oval; peristome simple, acute, almost hiding the very narrow perforation. Lat. maj. 15, min. 13½, alt. 9. mill.

*Helix biangulata*, *Pfr. in Phil. Icon.* i. 7. p. 155, t. 5. f. 12; *Proc. Zool. Soc.* 1845, p. 40; *Mon. Helic.* i. 80; *Id.* ii. 125.

*Chemn. ed. 2, Helix*, n. 550. t. 88. f. 6, 7.

*Reeve*, n. 157. t. 35.

*Alb.* 118 (Thea).

*Hab.* Luzon, Philippines.

## (1283) *Nanina filocincta*.

Shell perforated, depressed, thin, pellucid, horny, striatulate, bright; spire scarcely elevated, obtuse; whorls five and a half, slightly convex, keeled, the last convex beneath; keel thread-like, conspicuous on the higher whorls, but not exerted; aperture vertical, somewhat ear-shaped lunar; peristome simple, straight, columellar margin very oblique, elongated, descending, suddenly ascending on the right. Lat. maj. 11, min. 10, alt. 5½ mill.

*Helix filocincta*, *Pfr. Proc. Zool. Soc.* 1845, p. 124; *Mon. Helic.* i. 82; *Id.* ii. 127.

*Chemn. ed. 2, Helix*, n. 553. t. 88. f. 24-26.

*Reeve*, n. 158 t. 36.



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*Nanina* (Xesta) *filocinea*, *Alb.* 59.

*Hab.* Mindanao, Philippines.

(1284) *Nanina excentrica*.

Shell subperforated, nearly level above, inflated beneath, thin, waxen, shining, slightly ridged with excentric striae, acutely keeled; whorls four, plane above, rapidly increasing; aperture hatchet-shaped; peristome simple, acute, dilately reflected at the very narrow perforation. Lat. maj. 18, min. 15, alt.  $8\frac{1}{2}$  mill.

*Helix excentrica*, *Pfr. Proc. Zool. Soc.* 1845, p. 41; *Mon. Helic.* i. 83.

*Chemn.* ed. 2, *Helix*, n. 552. t. 88. f. 14-16.

*Reeve*, n. 152, t. 34.

*Alb.* 111 (Corasia).

*Hab.* Philippines.

(1285) *Nanina Panayensis*.

Shell obfectly perforated, depressed, orbicular, keeled rather thick, greyish-brown above, very minutely granulated, radiately striated beneath, very bright, olivaceous; spire depressedly conoidal; whorls six, planulate, the last not deflected; aperture angulate-lunar, whitish inside; peristome simple, thickened below, slightly expanded at the columella. Lat. maj. 44, min. 40, alt. 21 mill.

*Animal*, B. M. Caudal gland very large; teeth four-sided, close.

*Carocolla Panayensis*, *Brod M. S. S.*

*Helix Panayensis*, *Pfr. Proc. Zool. Soc.* 1842, p. 86; *Symb.* ii. 36; *Mon. Helic.* i. 74; iii. 165.

*Chemn.* ed. 2, *Helix*, n. 215 t. 30. f. 1-3.

*Nanina* (Hemiplecta) *Panayensis*, *Albers, Heliceen*, 61.

*Helix semigranosa*, var, *Reeve, Icon.* t. 27 f. 115, 117 a.

*Helix Panayensis* var., *Chemn.* ed. 2, *Helix*, t. 30. f. 4.

*Hab.* Panay Cayagan, Philippines.

(1286) *Nanina semigranosa*.

Shell subperforate, depressed, suborbicular, pale olive-brown, apex reddish, granulated above, smooth beneath, shining; spire conoidally depressed; whorls six, the highest subplanulate, the two last rounded, the last obtusely angulated in the middle, with one rufous band; aperture wide, lunar; peristome simple, slightly thickened at the base. Lat. maj. 36, min. 32, alt. 20 mill.

*Helix semigranosa*, *Sow. in Proc. Zool. Soc.* 1841, p. 26.

*Pfr. Symb.* ii. 21; *Mon. Helic.* i. 74, iii. 166.

*Chemn.* ed. 2, *Helix*, n. 185. t. 34. f. 3, 4.

*Reeve*, t. 27. f. 117 b.

*Helix Blainvilliana*, *Lea. in Phil. Trans.* vii. 463. t. 12. f. 15.

*Nanina* (Hemiplecta) *semigranosa*, *Albers, Heliceen*, 61.

*Hab.* Luzon, Philippines.

## MOLLUSCA.

### i. Moluccas.

(1287) *Nanina simplex*.

Shell orbiculate-convex, imperforate, slightly impressed beneath, obliquely striated, pale reddish (more darkly banded); spire subconoidal, apex reddish; lip simple, rather acute. Lat. 40, alt. 23 mill.

*Helix* (*Helicogena*) *simplex* *Lam.* 42. p. 77. ed. *Desh.* 45.

*Fer. Pr. Add.* 48 bis; *Hist.* t. 25 B. f. 6.

*Pfr. Mon. Helic.* ii. 20.

*Desh. Hist. Hel.* 162. n. 215.

*Eurycratera simplex*, *Beck, Ind.* 46.

*Hab.* Amboina.

(1288) *Nanina misella*.

Shell imperforate, somewhat convexly-orbiculate, thin, very obscurely striatulate, bright, pellucid, pale horny; whorls five and a half, nearly level, the last keeled, slightly convex beneath impressed in the middle; aperture subvertical, angulated-lunar; peristome simple, thin, columellar margin obliquely arched, slightly thickened. Lat. maj. 8, min 7, alt. 4 mill.

*Helix* (*Helicostyla*) *misella*, *Fer. Pr.* 306 in *Voy. de Freycinet, Zool.* 473.

*Helix misella*, *Quoy & Gaim. Astrol.* ii 122. t. 10. f. 5-9.

*Lam.* ed. *Desh.* 195. p. 121.

*Chemn.* ed. 2. *Helix*, n. 210. t. 29. f. 14-16.

*Pfr. Mon. Helic.* i. 38; *Id.* i. 237.

*Reeve*, n. 632. t. 111.

*Nanina* (*Microcystis*) *missella*, *Alb.* 60.

*Caracolla misella*, *Beck, Ind.* 31. n. 5.

*Hab.* Guan Island, Moluccas; Sandwich Islands.

(1289) *Nanina Clairvillia*

Shell perforated, somewhat turbinated, smooth, lutescent, brown above; whorls six, convex, the last tumid; aperture rounded-lunar; peristome white, obtuse, columellar margin steep, somewhat arched, slightly reflected. Lat. maj. 43, min 36, alt. 32 mill.

*Helix* (*Helicella*) *Clairvillia*, *Fer. Pr.* 243 *Hist.* t. 91. f. 1.

*Pfr. Mon. Helic.* i. 43.

*Desh. l. c.* 182. n. 243.

*Nanina Clairvillia*, *Gray, Proc. Zool. Soc.* 1834, p. 59.

*Beck, Ind.* 3.

*Geve*, t. 26. f. 277 (*Beck*).

*Helix Clairvillia*, var. a. *Fer. Hist.* t. 19. f. 2. 3.

*Hab.* Amboina.

(1290) *Nanina Stuartia*.

Shell obsoletely preforated, depressedly turbinated, striated, white, variously ornamented with brown and blackish bands; spire widely conoidal; whorls six, scarcely convex, the last rather planulate beneath; aperture very oblique, lunar; peristome simple, upper margin arched forwards,

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perforation. Lat. maj. 40, min. 36, alt. 26 mill.

*Helix Stuartiæ*, Gray. in *Mus. Brit.*

[*Pfr. in Zeitschr. f. Mal.* 1845, p. 154; *Mon. Helic.* i. 44; *Ik.* i. 315.

*Chemn. ed. 2, Helix*, n. 311. t. 54. f. 9-11.

*Fer. Hist.* t. 87. f. 5.

*Desh. l. c.* 185. n. 247.

*Reeve*, n. 462. t. 86.

*Nanina* (Xesta) *Stuartiæ*, *Alb.* 59.

*Nanina* *Steuarti*, *Beck, Ind.* 4 n. 24?

*Hab.* Celebes.

(1291) *Nanina cidaris*.

Shell globose-turbinata, rather thin, with oblique wrinkled striæ, shining, pale fulvous; spiral conoidal, with the apex blunt; whorls six, the upper one scarcely convex, the last one infla, obsoletely angular, with transverse impressed lines coarsely decussate, with one reddish-brown band at the periphery, rather compressed beneath round the umbilicus, which is very narrow; aperture little oblique, rounded-lunate, pearly inside, with the band shining through; peristome simple, sharp, with the margins convergent, columellar margin reflected above into a triangular lamina. Height 25, greatest breadth 40, least breadth 36 mill. (*Pfr.*)

*Helix cidaris*, *Lam. Hist. A. s. V.* 43. 77; ed 2 *Desh.* 45.

*Delessert Recueil*, t. 26. f. 11.

*Pfr. Mon.* i. 45. n. 79; *Ik.* n. 748. t. 122. f. 1-3; *Mon. Suppl.* 43.

*Chenu, Illustr. Conch.* livr. 72. t. 12. f. 11.

*Reeve*, n. 464. t. 86.

*Nanina* (Ryssota) *cydaris*, *Alb.* 61.

*Nanina rapa*, *Beck, Ind.* 3.

*Hab.* Timor.

(1292) *Nanina nemorensis*.

Shell subperforate, orbiculate-conic, solid, bright, white, surrounded with brownish bands; whorls six, scarcely convex; aperture lunate-rounded; peristome simple, acute, basal margin thickened inwards, slightly reflected at the columella. Lat. maj. 33, min. 30, alt. 25 mill.

*Helix nemorensis*, *Müll. Verm.* ii. ind.

*Fer. Pr.* 232 (*Helicella*).

*Chemn. ed. 2, Helix*, n. 183. t. 35. f. 9.—11.

*Pfr. Mon. Helic.* i. 46; *Ik.* i. 215.

*Reeve*, n. 474 t. 83.

*Nanina nemorensis*, Gray in *Proc. Zool. Soc.* 1834, p. 59. *Beck. Ind.* 4.

*Nanina* (Xesta) *nemorensis*, *Alb.* 59.

Var. *Helix sulphurea* *Reeve, Conch. Icon.* n. 476. t. 88.

*Helix nemoralis*, *Müll. Verm.* ii. 62. n. 257.

*Helix cretacea*, *Born. Mus.* 376. t. 16. f. 1, 2.

*Chemn. ix. pt. 2.* 119. t. 129. f. 1146, 1147.

*Helix Neuvardii*, *De Haan (Menke, Syn.)*

*Hab.* Moluccas; New Ireland.

(1293) *Nanina trochus*.

Shell perforate, conic, trochiform, rather solid, minutely striated, scarcely shining, white, with a

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single broad brown band, or several narrow ones, which sometimes are confluent, at the periphery; spire conic; apex white, rather blunt; whorls six, moderately convex, the last not descending, rounded at its periphery, rather flattened beneath; aperture oblique, roundish-lunate, uniformly milk-white within; peristome simple, straight, columellar margin declivous, somewhat thickened and reflected into a very small convex lamina near the open perforation. Height nearly 20, greatest breadth 25, least breadth 22 mill. (*Pfr.*)

*Helix trochus*, *Müller Pfr, Mon.* i. 46. n. 82; *Z f. M.* 1851. p. 10; *Ik.* i. 160. t. 146. f. 3-5 *Mon. Suppl.* 46.

*Reeve*, n. 475. t. 88.

*Hab.* Moluccas.

(1294) *Nanina Steursii*,

Shell perforate, depressedly turbinata, closely decussated with irregular striæ and impressed spiral lines, not shining, pale yellowish, with a blackish-purple band above and a broad whitish band below the periphery; spire rather pointed; whorls five, enlarging gradually, scarcely convex, the last rather flattened beneath, marked near the perforation, with a fuscous-purple area; aperture oblique, lunate; peristome simple, sharp, with the columellar margin imperceptibly dilated and reflexed. Height 14, greatest breadth 23, least breadth 19 mill. (*Sh.*)

*Nanina Steursii*, *Shuttleworth in Bern. Mitth.* Aug. 1852, p. 194.

*Helix Steursii*, *Pfr. Mon. Suppl.* 627.

*Hab.* Amboina (*V. Steures*).

(1295) *Nanina stolephora*.

Shell somewhat obliquely perforated, subdiscoidal, nearly smooth, obliquely striated, obtusely angulated, depressed above, very pale yellowish-red, convex beneath, surrounded beneath the angle with a red band, paler downwards, reticulately striated; whorls four, nearly level; aperture very oblique, strongly, depressed; peristome scarcely thickened, margins united by a callus, early covering the perforation. Lat. maj. 52. min. 40, alt. 20 mill.

*Helix stolephora*, *Valenc. in Hump. Voy. Zool.* ii. 242. t. 56. f. 4. *Pfr. Zeitschr. f. Mal.* 1844, p. 179; *Mon. Helic.* i. 52; *Ik.* i. 196.

*Chemn. ed. 2. Helix*, n. 162. t. 32 f. 1. 2.

*Desh. Hist. Hel.* 159 n. 212. t. 100. f. 3-5.

*Reeve*, n. 14. t. 4.

*Helix* (*Helicella*) *bupthalmus*, *Fer. Pr.* 238. *Bull. Zool.* 1835, p. 33.

*Helix Lamarekiana* *Pfr. Symb.* ii. 19.

*Nanina stolephora*, *Pfr. Symb.* ii. 63.

*Alb.* 61 (*Ryssota*).

*Nanina bicolor* *Pfr. Symb.* i. 36.

*Eurycratera stolephora*, *Beck, Ind.* 46.

*Hab.* New Spain (*Valenc.*); Asiatic Archipelago (*Fer.*)

(1296) *Nanina aulica*.

Shell perforate, depressed, thin diaphanous,



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shining, very varying in colours and bands with radiating striæ and generally spiral irregularly impressed lines above; spire very shortly raised, obtusely conoidal; whorls four and a half, rather flattened, rapidly increasing, the last one depressed very obsoletely angulated at its periphery, more convex beneath; aperture very large, oblique, truncate-oval, the proportion of its breadth to its height being 6:5; peristome simple, straight, with the upper margin descending very slowly, columellar margin arcuate, shortly reflected above. Height 23, greatest breadth 48, least breadth 41 Mill. (*Pfr.*)

*Helix aulica* *Pfr.* in *Proc. Zool. Soc.* 1851, p. *Ic.* t. 34, f. 4, 5. 147. f. 10. *Mon. Suppl.* 61.

*Reeve*, n. 481. t. 89.

*Hab.* Moluccas.

(1297) *Nanina luctuosa*.

Shell perforated, conoidally depressed rather thin, distinctly striated, principally near the suture, variously painted and banded; spire conoidal, with the apex rather pointed and for the most part blackish violaceous; whorls four and a half, moderately convex, enlarging gradually, the last not descending, more convex beneath; aperture diagonal, lunariy ovate, much broader than high; peristome simple, straight, with the columellar margin very declivous, reflected above into a triangular lamina. Height 17, greatest breadth 32, least breadth 26 mill. (*Pfr.*)

*Nanina luctuosa*, *Beck*, *Ind.* 3. n. 2.

*Helix luctuosa*, *Pfr.* *Mon. Suppl.* 629.

*Helix citrina*, var., *Mull.*; *Chemn.*; *Pfr.* *Mon.* i. 53.

Chestnut-coloured above, with a broad white band above the periphery, white beneath, with a brown umbilical spot. — *Chemn.* ix. f. 1174!

Brownish-gray above, with the peripheral girdle of the same colour, bordered with brown. — *Chemn.* f. 1175.

White, with a single blackish-brown girdle. — *Chemn.* f. 1171.

*Hab.* Moluccas.

(1298) *Nanina rapa*.

Shell perforated (imperforate) subglobose, with sunken dots, and a sanguine band; whorl deflected inwards above. Lat. 18 lin.

*Helix rapa*, *Mull. Verm.* ii. 67. n. 261.

*Chemn.* ix. 2. p. 134. t. 131. f. 1176.

*Pfr.* in *Zeitschr. f. Mal.* 1844, p. 178; *Mon. Helic.* i. 62.

*Reeve. Conch. Icon.* n. 19. t. 4?

*Hab.* Amboina.

(1299) *Nanina monozonalis*.

Shell perforated, orbiculate convex, ventricose, bright, very finely decussated above, with close longitudinal and transverse lines, chestnut, with one white zone above the middle; spire scarcely elevated; whorls five, slightly convex, the last inflated, whitish around the open perforation; aperture large, rounded-lunar; peristome acute,

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columellar margin slightly reflected. Lat. maj. 50, min. 42, alt. 26, mill.

*Helix monozonalis*, *Lam.* 4. p. 66; ed. *Desh.* p. 29.

*Pfr.* *Mon. Helic.* i. 72; *Ic.* n. 994. t. 150. f. 12, 13 *Desh.* in *Encycl. Meth.* ii, 256. n. 126; in *Fer.* i. 182, n. 244 (with a variety?, t. 88 f. 4, 5).

*Reeve*, n. 467. t. 86.

*Helix unizonalis*, *Encycl. Meth.* t. 462, f. 6.

(*Helicella*) *Fer. Pr.* 241; *Hist.* t. 91. f. 411.

*Nanina monozonalis*, *Gray. Proc. Zool. Soc.* 1834, p. 59.

*Beck, Ind.* 3. n. 6.

*Alb.* 61 (*Ryssota*).

*Zonites unizonalis*, *Swains. Malac.* 331.

With two broad reddish-brown bands. — *Pfr.* *Ic.* t. 147. f. 14.

*Hab.* Amboina.

(1300) *Nanina distincta*.

Shell umbilicate, semiglobose, rather turbinate, solid, faintly striated, minutely foveolate above, fulvous flesh-coloured; spire broadly conoidal, rather blunt; whorls five and a half, moderately convex, the last marked with a white peripheral band, scarcely descending anteriorly, convex beneath, compressed and white round the umbilicus, which is narrow and open; aperture little oblique, lunate-roundish; peristome simple, blunt, columellar margin rather thickened, reflected above into a moderate lamina. Height 32, greatest breadth 56, least breadth 49 mill. (*Pfr.*)

*Helix distincta*, *Pfr.* in *Z. f. M.* 1850, p. 69; *Ic.* n. 863. t. 134. f. 1, 2; *Mon. Suppl.* 81.

*Reeve*, n. 465. t. 86.

*Hab.* Moluccas.

(1301) *Nanina citrina*.

Shell perforate, conoidally depressed, rather solid, very faintly striated, smooth, shining, yellow, reddish, white, cinnamon-coloured or violaceous, with reddish-brown, white or black bands; spire conoidal, rather blunt; suture white-bordered; whorls five, rather convex, enlarging regularly, the last rounded, scarcely more convex beneath; aperture oblique, roundish-lunate; peristome simple, upper margin descending immediately from the point of its insertion; columellar margin declivous, nearly rectilinear. Height 22, greatest breadth 39, least breadth 33 mill. Breadth of the aperture to its height=10:9. (*Pfr.*)

*Animal*—Mantle not produced behind. — *Voy. Astrol.* t. 2. f. 1. 2—*Gray. Fig. Moll.* t. 1. f. 1.

*Helix citrina*, *Linn. Syst.* ed. 10. p. 771; ed. 12. n. 679. p. 1245.

*Quoy and Gaim.* t. 11. f. 1, 4.

*Born, Mus.* 377. t. 13. f. 14, 15; t. 15. f. 1. 10.

*Chemn.* ix. pt. 2. 130. t. 131. f. 1167; 1175.

*Lam.* 44. p. 77; ed. *Desh.* p. 45.

*Helix citrina*, *Fer. Pr.* 240; *Hist.* t. 71—73. in *Voy. de Freyc. Zool.* 471. t. 67. f. 2, 3

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*Chamn.* ed. 2. *Helix*. n. 181. t. 24. f. 1, 2? ;  
t. 35. f. 1—5.

*Pfr. Mon. Helic.* i. 53, iii. 60: *Icon.* i. 212.  
t. 141. f. 11, 12, 13, 15.

*Desh.* l. c. 189. t. 88 f. 2.

*Reeve, Conch. Icon.* n. 482. t. 89; var. t. 90.  
f. 485. f. a. b.

*Helix variegata*, *Humphr. Mus. Calonn.* (Fer.)

*Nanina citrina*, *Gray, Proc. Zool. Soc.* 1831,  
p. 59.

*Nanina citrina et luctuosa*, *Beck, Ind.* 3.

*Nanina (Xesta) citrina Alberz, Helic.* 53

*Vitrina citrina*, *Quoy and Gaim. Astrol.* ii.  
140. t. 11. f. 1—4 (and animal).

*Zonites citrina*, *Swains. Malac.* 331.

*Seba, Mus.* iii. t. 39. f. 1—10.

*Pomatia succinea*, *ruteola*, *dimidiata*, *rutila*,  
*flaveola*, *citrina*, *paleacea*, *straminea*, *Bolt.* 74.  
n. 953—960.

*Hab.* Moluccas.

(1302) *Nanina tumens*.

Shell perforate, turbinate-semiglobular, rather solid, slightly striated and (under a lens) obliquely decussated, diaphanous, shining, yellowish-white, with a single narrow reddish-brown band; spire flesh-coloured, conoidal with convex outlines and a rather blunt apex; suture somewhat bordered above; whorls five and a half, moderately convex, the last rounded, not descending; aperture oblique, roundish-lunate, of equal height and breadth; peristome simple, straight, with the columellar margin callous, dilated above into a reflected triangular lamina. Height 26, greatest breadth 39, least breadth 34½ mill. (*Pfr.*)

*Helix tumens*, *Deshayes in Fer. Hist.* i. 188.  
n. 252. t. 89, f. 4.

*Reeve, n.* 477. t. 88.

*Pfr. Mon. Suppl.* 43.

*Helix citrina*, var., *Pfr. Ic.* t. 24. f. 1, 2?

*Hab.* Moluccas.

(1303) *Nanina vitellus*.

Shell narrowly perforate, conoidally semiglobular, rather solid, smooth, little shining, yellow, with a white line at the suture; spire conoidal, with the outlines convex and the apex rather pointed; whorls five, moderately convex, enlarging rapidly, the last rounded; aperture little oblique, roundish-lunate; peristome simple, straight, with the margins scarcely convergent, columellar margin very shortly reflected above. Height 22, greatest breadth 35, least breadth 32 mill. (*Pfr.*)

*Nanina vitellus*, *Shuttleworth in Bern Mittheil.*  
Aug. 1852, p. 194.

*Helix vitellus*, *Pfr. Ic.* n. 957. t. 145. f. 14;  
*Mon. Suppl.* 44.

*Helix citrina*, var., *Reeve, Conch. Icon.* t. 88.  
f. 478.

*Hab.* Amboina.

This may be considered as a variety of *N.*  
*vitellus*.

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(1304) *Nanina Lennepiana*.

Shell perforate, turbinate-globular, thin, marked with slight and crowded oblique striæ, diaphanous, painted with broader and smaller bands, which are alternately pale horn-coloured, translucent and white, rather opaque; spire shortly conoidal, with the outlines convex, and the apex rather acuminate; suture deep, somewhat channelled; whorls five and a half, moderately convex, the last one large, ventricose, not descending anteriorly; aperture diagonal, lunate-rounded; peristome simple, straight, with the margins a little convergent, right margin slightly dilated in the middle, columellar margin reflected into a very small triangular lamina. Height 22, greatest breadth 32, least breadth 28½ mill. (*Pfr.*)

*Helix Lennepiana*, *Pfr. in Zeitschr. f. Malak.*  
1852, p. 91; *Ic.* n. 1074. t. 158. f. 31, 32;  
*Mon. Suppl.* 44.

Locality unknown, probably from the Moluccas.

(1305) *Nanina gypsacea*.

Shell perforate, conoidal, rather solid, irregularly striated, a little shining, white, with two pale brownish bands around the periphery; spire conoidal, with the outlines convex and the apex rather pointed; whorls six and a half, slowly increasing, moderately convex, the last one not descending, obsoletely angular at the periphery, rather flattened beneath; aperture little oblique, broadly lunate; peristome simple, straight, with the columellar margin reflected into a small convex lamina. Height 18, greatest breadth 30, least breadth 27 mill. (*Pfr.*)

*Helix gypsacea*, *Pfr. in Z. f. M.* 1850, p. 82;  
*Ic.* n. 878. t. 135 f. 22, 23; *Mon. Suppl.* 45.

Locality unknown.

j. Borneo.

(1306) *Nanina conicoides*.

Shell imperforate, conoidal, rather thin, slightly striate, keeled and marked with several obsoletely raised spiral lines near the keel, rather shining, horn-coloured; spire conic with concave outlines and the apex rather blunt; suture flat; whorls seven, flattened, slowly increasing, the last one not descending, showing a brown band on the compressed, sharp keel, rather convex beneath and impressed in the centre; aperture oblique, depressed-rhomboidal; peristome simple, straight, sharp, with the columellar margin a little thickened above. Height 84, greatest breadth 18, least breadth 16 mill. (*Pfr.*)

*Helix conicoides*, *Metcalf in Proc. Zool. Soc.*  
1851, p. 71. *Reeve, n.* 449. t. 84.

*Pfr. Ic.* n. 1020. t. 153. f. 20, 21; *Mon. Suppl.*  
37.

*Hab.* Borneo.

(1307) *Nanina Tais*.

Shell imperforate, convex on both sides, keeled, rather thin, shining, horn-coloured yellowish or brownish horn-coloured, distinctly striated and very obsoletely decussated by spiral impressed lines; spire convex; apex blunt, suture impress-



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ed, bordered; whorls six, scarcely a little convex increasing gradually, the last not descending, acutely keeled, convex beneath; aperture nearly perpendicular, quadrangular, somewhat callous within; peristome simple, straight, sharp, with parallel margins, right margin short, basal margin slightly arched, columellar margin entering, declivous, callus, dilated above. Height 7; greatest breadth 13, least breadth 12 mill. (*Pfr.*)

*Helix Tais*, *Hambro & Jacquinet* Voy an Pol. Sud. Moll. t. 7. f. 42-45.

*Pfr. Mon. Suppl.* 37.

*Helix Tais*, *Pfr. in Z. f. M.* 1849, p. 68; *Id.* n. 782. t. 125. f. 32, 33.

*Reeve*, n. 598. t. 107.

*Helix tropidophora*, *A. Adams & Reeve*, *Voy. Samarang*, *Moll.* 59. t. 14. f. 14.

*Reeve*, *Conch. Icon.* n. 581. t. 105, and var. t. 107. f. 601.

*Hab.* Marquesas Islands and Borneo.

(1308) *Nanina Brookei*.

Shell subperforate, reversed, solid, turbinate, keeled, with crowded striae and minute granulations, undulated above by large, forward descending folds, shining, chestnut-coloured; spire sub-turbinate, rather pointed; whorls five, nearly flat, inflate below the suture, the last one rather obtusely carinate, ventricose, striate and minutely foveate, blackish beneath; aperture oblique, rather quadrangular, bluish-white inside, peristome simple, straight, with the margins joined by a white callus, the columellar margin declivous, rather thickened, dilated and reflected over the perforation. Height 45, greatest breadth 76, least breadth 63 mill (*Pfr.*)

*Helix Brookei*, *Adams & Reeve*, *V. Samarang*, *Moll.* 60. t. 15. f. 4.

*Reeve*, *Conch. Icon.* n. 377. t. 73.

*Pfr. Ic.* n. 870. t. 135 f. 1, 2; *Mon. Suppl.* 52.

*Helix gigas*, *Pfr. in Z. f. M.* 1850, p. 81.

*Hab.* Borneo.

(1309) *Nanina regalis*

Shell perforate, reversed, conoidally depressed, keeled, with crowded undulate striae and granulations, finely banded or uniform; spire conoidal, rather pointed; whorls six, nearly flat, slowly increasing, the middle ones obliquely undate, the last not descending, with a sharp keel, which is compressed from the lower side, shining, convex, very minutely decussated beneath, excavated in the centre, with the spiral striae obsolete near the perforation; aperture oblique, rather securiform; peristome sharp, basal margin arched, sinuated towards the umbilicus, columellar margin very slightly reflected. Height 13, greatest breadth 27, least breadth 25 mill. (*Pfr.*)

*Helix regalis*, *Benson in Ann. & Mag. Nat. Hist.* March 1850, p. 215.

*Pfr. Mon. Suppl.* 52.

With the undulate ribs scarcely conspicuous; colour a dirty wine-red, with a whitish-green band, which is bordered with blackish-chestnut,

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on the suture and on the keel; periomphalum whitish-yellow, surrounded by a blackish band.

*Helix vittata*, *Adams & Reeve*, *Voy Samarang*, *Moll.* 60. t. 15, f. 7 (not *Mull.*)

*Helix regalis*, *Reeve*, *Conch. Icon.* n. 529. t. 96. *Pfr. Ic.* n. 915. t. 141. f. 5, 6.

Uniformly purplish-brown, with more distinct undulate ribs.

*Helix regalis*, var., *Reeve*, t. 80. f. 426.

*Pfr. Ic.* t. 141. f. 7, 8.

*Hab.* Sarawak and Balambangan, Borneo (*Taylor*).

(1310) *Nanina glutinosa*.

Shell perforate, conoidally lenticular, keeled, thin, glutinous-shining, of a light chestnut-colour marked with very minute spiral lines; spire conoidal, rather pointed; suture scarcely impressed, obscurely bordered; whorls six, rather flat, the last not descending, girdled at its periphery with a compressed, rounded, darker-coloured keel, convex beneath; aperture oblique, lunate, angular; peristome simple, straight, sharp, columellar margin very shortly reflected above. Height  $14\frac{1}{2}$ , greatest breadth 28, least breadth  $24\frac{1}{2}$  mill. (*Pfr.*)

*Helix glutinosa*, *Metcalf* in *Proc. Zool. Soc.* 1851, p. 70.

*Pfr. Mon. Suppl.* 54.

*Hab.* Borneo.

(1311) *Nanina Souleyetiana*.

Shell perforated, conoidal, depressed, rather solid, with wrinkled striae and with very crowded waving lines above between the striae, pale fulvous; spire shortly conoidal, rather blunt; whorls six, rather flattened, increasing slowly, the last one sharply keeled, convex, and with a chestnut-coloured band below the keel, deeply excavated in the middle; aperture very oblique, lunate, angulated; peristome simple, with the margins nearly parallel, right margin forward, somewhat arcuate, columellar margin rather thickened, very shortly reflected above. Height 18, greatest breadth 12, least breadth 56 mill. (*Pfr.*)

*Helix Souleyetina*, *Pfeiffer Proc. Zool. Soc.* 1851; *Id.* n. 950. t. 148. f. 16, 17; *Mon. Suppl.* 74.

*Reeve*, n. 378. t. 73.

*Hab.* —?

(1312) *Nanina Donovanii*.

Shell perforated, somewhat depressed, thin, keeled, striate very minutely decussated above with oblique lines which are rather concentric beneath, scarcely shining, diaphanous, fulvous; spire very shortly conoidal, suture impressed; whorls five and a half, flat, rapidly increasing, the last one dilated, not descending anteriorly, rather flattened above, with one chestnut-coloured band on the keel, which is rather sharp, inflated below the keel and slightly excavated to the middle; aperture oblique, rhomboidally oval, pearly inside; peristome simple, sharp, with the columellar mar-

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gin very declivous, reflected into a vaulted triangular lamina near the perforation, which is extremely narrow and not pervious. Height 21, greatest breadth 47, least breadth 37 mill. (Pfr.)

*Helix* Donovan, *Pfeiffer in Z. f. M.* 1851. 26. *Icon. n.* 967. t. 147. f. 8. 9; *Mon. Suppl.* 75.

*Hab.* Borneo.

This species has nearly the same sculpture as *N. Humphreysiana*; in shape it more resembles *N. stolephora*.

k. New Guinea.

(1313) *Nanina Foullyoi*.

Shell orbiculate-conoidal, umbilicated, fulvous-olive under the olivaceous epidermis, depressedly concave beneath, white; whorls five and a half, slightly depressed at the suture, finely cancellately-granulated, the lowest zoned in the middle with a white band, broadly bordered beneath with dark violet; umbilicus deep, contracted towards the outline; aperture oblique, semi-oblong, contracted behind and sinuated at the base; lip sharp, reflected at the umbilicus. Lat. 46. alt. 29 mill.

*Helix* Foullyoi, *Le Guillou in Reeve Zool.* 1845. p. 187.

*Pfr. Mon. Helic.* ii. 44.

*Hab.* New Guinea; Triton Bay.

(1314) *Nanina Baudini*.

Shell orbiculate-convex, substriated, pale fulvous; whorls seven, very slightly convex, the last slightly keeled with white at the base; suture smooth; umbilicus very small; aperture nearly perpendicular, very small, obliquely semilunate; peristome simple, slightly thickened beneath. Lat. 22 mill.

*Helix* Baudini, *Desh. in Encycl. Meth.* ii. 256 n. 127.

*Pfr. Mon. Helic.* i. 55.

*Nanina* Baudini, *Beck. Ind.* 4.

*Hab.* New Guinea.

(1315) *Nanina divisa*.

Shell perforate, very much depressed, rather thin, obliquely striated above and obsolete decussated with impressed lines, reddish-fulvid; spire little raised, with the apex blunt; suture bordered; whorls five, flat, the last one not descending, compressedly keeled at its periphery, convex, rather smooth and shining beneath; aperture oblique, lunate, angulated; peristome simple, straight, with the columellar margin shortly reflected above. Height  $9\frac{1}{2}$ , greatest breadth 24, least breadth 21 mill. (Pfr.)

*Helix* divisa, *Forbes in Voy of the Rattlesnake, App.* 376. t. 2. f. 5.

*Pfr. Mon. Suppl.* 77.

*Hab.* Louisiade Islands (Macgillivray).

(1316) *Nanina calamechroa*;

Shell perforated, globosely-depressed, thin, bright, pellucid, straw-coloured, regularly striated transversely, decussated by very fine spiral lines, scarcely visible with the naked eye; whorls five and a half, increasing gradually;

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aperture lunar; peristome simple, acute. Lat. maj 17, min.  $15\frac{1}{2}$ , alt. 8 mill.

*Helix calamechroa*, *Jonas in Phil. Icon.* i. 3. 47. t. 3. f. 2.

*Pfr. Mon. Helic.* i. 57; *Icon. n.* 816. t. 129. f. 11, 12.

*Helix tenera*, *Jonas*, olim.

*Nanina* (Xesta) *Calamechroa*, *Alb.* 59.

*Macrochlamys*, *Morck Cat. Yold.* 2.

*Hab.* Guinea.

(1317) *Ariophanta laevipes*.

Shell sinistral, perforate, rather depressed, thin, keeled, with distinct striæ of growth, decussated under the lens by several spiral lines, pale horn-coloured, with one brown peripheral band, which sometimes is bordered with a white one; whorls four and a half, rather flattened, the last one not descending, inflated beneath; aperture oblique, lunate, rather angulated; peristome simple, straight, with the margins convergent, columellar margin ascending nearly perpendicularly, somewhat reflected. Height  $14\frac{1}{2}$ , greatest breadth 28, least breadth 23 mill. (Pfr.)

*Helix laevipes*, *Mull., Pfr. Mon.* i. 71. n. 163 (excluding the var.); *Mon. Suppl.* 75; *Mon. Helic.* i. 71.

*Desh. Helic.* p. 177. n. 238.

*Reeve*, n. 397. t. 76.

*Mull. Verm.* ii. 22. n. 222.

*Chemn.* ix. pt. 1. p. 83; ed. 2. *Helix*, n. 523. t. 84. f. 22, 23.

(*Helicella*) *Fer. Pr.* 229; *Hist.* t. 92. f. 3-6.

*Helix candida*, *Gmel.* 15? (*Becke*).

*Ariophanta laevipes*, *Desmoulins, Bull. Bord.* iii. 227. t. 1. f. 1-5.

*Fer. in Bull. Zool.* 1835, p. 108.

*Gray, Fig. Moll.* t. 288. f. 6, 7.

*Beck, Ind.* 5.

*Vitrina laevipes*, *Ant. Verz.* p. 33. n. 1264.

*Nanina* (*Ariophanta*) *laevipes*, *Alb.* 62.

*Pfr. Symb.* ii. 63.

*Revanne*, t. 63. f. L. 3.

*Helix laevipes*, *Chemn.* ix. t. 108. f. 915, 916. var., *Fer.* t. 92. f. 6.

*Helix spadicea*, *Gmel.* 16.

*Kammerer*, p. 172. t. 11. f. 2.

*Helix trifasciata*, *Chemn.* ii. 308. t. 213. f. 3018, 3019.

*Helix laevipes*, var., *Fer. Hist.* t. 92. f. 4.

*Chemn.* ed. 2, *Helix*, t. 84. f. 20. 21.

*Ariophanta trifasciata*, *Beck, Ind.* 5.

*Hab.* Malabar, Tranquebar.

(1318) *Ariophanta trifasciata*.

Shell sinistral, perforate, rather conoidally depressed, striate, decussated with crowded spiral lines, little shining, fulvous-whitish, with three chestnut-coloured bands, one of which runs along the suture, the second above, and the third below the periphery of the last whorl; spire rather conoidally raised; whorls five, scarcely convex, regularly increasing; the last one keeled, rather rounded anteriorly, deflected, convex beneath;



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aperture small, very oblique, regularly lunate; peristome simple, sharp, with the margins distant, columellar margin declivous, rather thickened, shortly reflected near the perforation. Height 14, greatest breadth  $25\frac{1}{2}$ , least breadth 22 mill. (*Pfr.*)

*Helix trifasciata*, *Chemn. Conch. Cab.* xi. 308. t. 213. f. 3018, 3019.

*Pfr. Ic.* n. 523. a. t. 84. f. 20, 21; t. 136. f. 13; *Mon. Sup.* 76.

*Helix lævipes*, var., *Fer.* t. 92. f. 4.

*Pfr. Mon.* i. 72.

*Ariophanta trifasciata*, *Beck, Ind.* p. 5. n. 3.

*Hab.* Malabar, Tranquebar.

(1319) *Ariophanta Bombayana*.

Shell dextral, perforate, rather depressed, keeled, slightly striate and under the lens very minutely decussated above, scarcely diaphanous, brownish rose-coloured; whorls five, little convex, the last one not descending, rounded anteriorly, convex and pale beneath; aperture oblique rounded-lunate; peristome simple, blunt, with the columellar margin shortly reflected above. Height 16, greatest breadth 28, least breadth 23 mill. (*Pfr.*)

*Helix Bombayana*, *Grat., Pfr. Mon.* i. 41. n. 68.

*Desh.* n. *Fer.* p. 181. n. 242. t. 691. f. 5.

*Pfr. Ic.* n. 832. t. 130. f. 4, 5; *Mon. Suppl.* 76.

*Helix rubescens*, *Desh. M.S.S.*

*Hab.* From woods near Bombay.

(1320) *Ariophanta Himalayana*.

Shell narrowly umbilicated, sinistral, depressed, thin, pellucid, costulated above, pale fulvous; spire scarcely elevated; whorls four and a half to five, nearly level, the last slightly keeled, brown-banded beneath the keel, tumid beneath; aperture rounded-lunar; peristome simple, acute, columellar margin slightly descending, reflected. Lat. maj. 30, min. 25, alt. 15 mill.

*Helix Himalana*, *Lea, Obs.* i. 167. f. t. 1966.

*Helix Himalayana*, *Benson in Zool. Journ.* v. (1835) 461.

*Pfr. Mon. Helic.* i. 63.

*Reeve, Icon.* n. 389. t. 75.

*Ariophanta Himalayana*, *Beck. Ind.* p. 5. n. 5.

*Nanina (Ariophanta) Himalajana*, *Alb. Helic.* 62.

*Hab.* Himalaya.

(1321) *Ariophanta Retrorsa*.

Shell perforated, sinistral, somewhat lenticular, rather thin, with impressed subspiral lines and very fine wavy and confluent wrinkles, pale chestnut or yellow-brown; spire scarcely elevated, apex rather acute; whorls five and a half, rapidly increasing, very slightly convex, the last acutely keeled, gibbous beneath; aperture rounded-lunar; peristome simple, columellar margin not reflected. Lat. maj. 44, min. 35, alt. 20 mill.

*Helix (Carocolla) retrorsa*, *Goeld, Boet. Journ.* iv. 455. t. 24. f. 4.

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*Helix retrorsa*, *Pfr. Mon. Helic.* i. 76; iii. n. 284.

*Chemn. ed. 2. Helix*, n. 686. t. 110. f. 4-6.

*Nanina retrorsa*, *Troschel, Wiegman. Arch.* 1849. i. 234. t. 4. f. 6.

*Nanina (Ariophanta) retrorsa*, *Albers, Heliceen*, 62.

*Hab.* Birmah.

(1322) *Ariophanta Janus*.

Shell perforated, sinistral, orbicular, thin, diaphanous, obliquely regularly and closely costulate-striated, brown above, convex beneath, reddish-chestnut, rather bright; spire widely conoidally-depressed; whorls seven, planulate, the last keeled; aperture lunar; peristome thin, acute, columellar margin slightly reflected. Lat. maj. 36, min. 31, alt. 17 mill.

*Helix Janus*, bifrons, *Chemn.* xi. 307. t. 213. f. 3016, 3017.

(*Helicella*), *Fer. Pr.* 233.

*Helix Janus*, *Pfr. Proc. Zool. Soc.* 1842, p. 87; *Mon. Helic.* i. 77; *Symb.* ii. 19; *Ic.* i. 88.

*Chemn. ed. 2. Helix*, n. 59. t. 11. f. 4-6.

*Reeve. Icon.* 494. t. 91.

*Hombr. & Jacq. Voy. Pol. Sud. Moll.* t. 5. f. 1-3.

*Helix Mackensii*, *Souleyet in Voy. Bonite. Moll.* t. 28. f. 27-29.

*Nanina (Ariophanta) Janus*, *Alb. Helic.* 62.

*Helix Mackensiana*, *Soul. Revue. Zool.* 1841. p. 347.

*Helix Balesteriana*, *Lea. Trans. Am. Phil. Soc.* vii. 460. t. 12. f. 10.

*Ariophanta Janus*, *Beck. Ind.* 5.

*Hab.* Mount Ophir, Malacca.

(1323) *Ariophanta nicobarica*.

Shell perforate, sinistral, solid, globular, obliquely striated, chestnut-red, white-zoned at the suture, outline and base; spire short, obtuse; whorls five and a half, slightly convex, the last descending in front, inflated beneath; aperture rounded-lunar, concolorous inside; peristome simple, obtuse, white, columellar margin slightly reflected, almost covering the perforation. Lat. maj. 37, min. 30, alt. 27 mill.

*Helix (Pomatia) contraria nicobarica*, *Chemn.* ix. pt. 1 p. 79. t. 108. f. 911, 912.

*Helix nicobarica*, *Desh. Guer. Mag.* 1839, t. 3.

*Pfr. Mon. Helic.* i. 40.

*Chemn. ed. 2. Helix*, n. 22. p. 49, t. 6. f. 6. 7.

*Ariophanta nicobarica*, *Beck. Ind.* p. 5. n. 7.

*Hab.* Nicobar Islands.

(1324) *Ariophanta Rumphii*.

Shell perforated, sinistral, orbiculate, keeled, dark cinnamon, white banded at the keel, nearly level above, irregularly rugosely striated, base convex, striated; whorls five and a half, level; aperture subrhombic, brown inside; peristome simple, columellar margin passing above into a spreading triangular lamina. Lat. maj. 44, min. 36, alt. 20 mill.

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*Helix Rumphii*, *V. d. Busch. in Phil. Icon.* i. l. p. 9. t. l. f. 2.

(*Nauina* ?), *Pfr. Symb.* ii. 20; *Mon. Helic.* i. 76, iii. n. 283.

*Chemn. ed.* 2, *Helix*, n. 60. t. 11. f. 7-9.

*Reeve, Icon.* n. 480. t. 88.

*Nauina Rumphii*, *Mouss. Jav. Moll.* 18. t. l. f. 2.

*Nauina (Ariophanta) Rumphii*, *Albers, Helic.* 62.

*Hab.* Java.

(1325) *Ariophanta Cysis*.

Shell narrowly and deeply umbilicated, sinistral, depressed-globular, rather thin, sculptured with oblique fold-like striae, brownish horn-coloured; spire convex, with the apex flattened; whorls four, convex, enlarging rapidly, the last inflated, obsoletely keeled at first, then rounded, shortly descending anteriorly, turgid beneath; aperture oblique, large, lunate, rather ovate; peristome simple, sharp, with convergent margins, outer and basal margins imperceptibly thickened, columellar margin shortly reflected. Height 13, greatest breadth 43, least breadth 35 mill. (*Bens.*)

*Helix Cysis*, *Benson in Ann. & Mag. N. H.* 2nd ser. ix. 1852, 404. *Pfr. Mon. Suppl.* 92.

*Helix Cystis*, *Reeve, Conch. Icon.* n. 737. t. 123.

*Hab.* Neilgherries, South India. (*Jerdon*).

(1326) *Vitrina præstans*, *Gould*. Mr. Mason errs in saying that this is the largest species of the Genus. In 1836 I described *V. gigas*, which is  $1\frac{3}{8}$  inch in greatest diameter. Tenasserim Provinces.

(1327) *Vitrina gigas*.

Shell rather solid, depressed, with arched striae, obsoletely and irregularly decussated by spiral lines, olive-horny; spire minute, level; suture impressed; whorls two and a half, rapidly increasing, the last slightly depressed above, outline rounded, base narrow; aperture very oblique, large, regularly transversely oblong, slightly callous inside, margins nearly contiguous, upper and lower rather straight, columellar slightly arched. Lat. 30 by 18, alt 13 mill.

*Vitrina gigas*, *Benson in Journ. As. Soc.* v. 350.

350. *Prf. Mon. Helic.* ii. 496. n. 10.

*Hab.* Bengal.

(1328) *Vitrina cassida*.

Shell depressed, thin, slightly striated, scarcely shining, not quite diaphanous, with the periphery ovate, pale greenish horn-coloured; spire very shortly conoidal, suture slightly bordered; whorls nearly five, enlarging rapidly, the last rounded, somewhat depressed, broad beneath and impressed in the centre; aperture very oblique; lunarly ovate, pearl-shining within; peristome simple, upper margin a little dilated forwards,

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slightly callus. Height 12, greatest breadth 26, least breadth 22 mill. (*Pfr.*)

*Vitrina cassida*, *Hutt Pfr. Mon.* ii. 497, n. 12. *Suppl.* 2; *Icon.* t. 2, f. 3, 5.

*Hab.* Simla, Western Himalaya.

(1329) *Vitrina præstans*.

Shell depressed semiglobose, thin, striatulate, slightly decussated by rather distant spiral lines, scarcely shining, pale horny; spire not prominent; suture very lightly impressed; whorls three, rapidly increasing, the last convex above, outline subdepressed, base rather wide; aperture very oblique, subtriangular semioval; peristome simple, slightly inflected, margins approximate, columellar receding, very arched. Lat. maj. 20, min. 16, alt. 10 mil.

*Vitrina præstans*, *Gould in Post. Journ.* iv. 456, t. 24 f. 2.

*Pfr. Mon. Helic.* ii. 497. n. 13.

*Hab.* Tavoy, Birmah.

(1330) *Vitrina monticola*.

Shell depressed, thin, striatulate, shining, pellucid, lutescent-horny; spire plane, scarcely prominent in the middle; suture lightly impressed; whorls four, rapidly increasing, nearly level, the last depressed, not descending; aperture oblique, rounded-lunar; peristome simple, margins connivent, united by a very thin callus, arched-dilated above in front, the columellar forming an obtuse angle with the basal, Lat. 18 by 14, alt  $7\frac{1}{2}$  mill.

*Vitrina monticola*, *Benson, M.S.S.*

*Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii. 497; *Icon.* t. 2. f. 6-8.

*Hab.* Bengal; Landour; Himalaya; Almorah.

(1331) *Vitrina Bensoni*.

Shell slightly depressed, thin, striatulate, bright, pellucid, pale horny; spire scarcely elevated, obtuse; suture impressed, slightly margined; whorls three and a half, slightly convex, the last rather depressed, rounded at the periphery, wide at the base; aperture oblique, lunate-sub-oval; peristome simple, slightly inflected, margins connivent, rather dilated in front above, columellar receding, much arched. Lat. maj. 12, min  $9\frac{1}{2}$ , alt 6 mill.

*Vitrina Bensoni*, *Pfr. in Proc. Zool. Soc.* 1848. *Mon. Helic.* ii. 497, n. 14.

*Hab.* E. Indies.

(1332) *Vitrina birmanica*.

Shell depressed, transversely ovate, very thin and smooth, bright, luteous-green; spire scarcely elevated; whorls four, rapidly increasing, scarcely convex, disunited at the impressed suture, the last subplanulate at the base; aperture very oblique, widely lunate-oval; peristome acute dextral margin arched in front. Lat. maj  $9\frac{1}{2}$ , min.  $7\frac{3}{4}$ , alt  $4\frac{2}{3}$  mill.

*Vitrina birmanica*, *Phil. in Zeitschr. f. Mal.* 1847, p. 65.

*Pfr. Mon. Helic.* ii. 498.



(1333) *Vitrina gruneri*.

Shell globose depressed, very smooth, dull, olive horny; spire scarcely raised; suture white-margined; whorls three and a half, slightly convex, the last rather depressed; aperture very oblique, lunate oval; peristome simple, margins connivent, columellar arched, sub inflected, Lat. maj. 8, min 6, alt 5 mill.

*Vitrina Gruneri*, *Pfr. Symp.* iii, 81; *Mon. Helic* ii, 498.

*Hab.* Arabia.

(1334) *Vitrina baccata*.

Shell small, thin, fragile, diaphanous and pale; whorls apparently only one, or at all events the body whorl may be said to constitute the whole shell, aperture nearly circular, lips scarcely interrupted slightly thickened and partially reflected, surface of the shell polished, finely striated by minute lines of growth, and ornamented with longitudinal bead like lines or strings of minute bubbles, which can be seen only under a strong lens, upper side depressed, flattened, under side rounded, ventricose. Length  $1\frac{1}{2}$  line. (*Hutton*.)

*Vitrina baccata*, *Hutton in Journ. As. Soc.* July 1809, p. 650.

*Pfr. Mon. Suppl.* 2.

*Hab.* Melnandeh, between Kopik Pass and Candahar, Afghanistan,

(1335) *Vitrina Cumingi*.

Shell depressed globose, very thin, finely striated, bright, whitish horny; spiral very short, obtuse; suture smooth, bordered by an impressed line; whorls four, scarcely convex, the last inflated, subdepressed, zoned in the middle by a rufous line; aperture rather oblique, lunate-rounded; peristome simple, margins remote, columellar subvertical, slightly arched, rather reflected above, resembling a punctiform perforation, scarcely arched above in front. Lat. maj. 20 min. 17, alt. 12 mill.

*Vitrina Cumingi*, *Beck, M.S.S.*

*Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii 498 n. 17, *Icon.* t. 3. 2. f. 1, 2.

*Hab.* Bohol, Philippines.

(1336) *Vitrina bicolor*.

Shell subglobose, thin, rather smooth, very bright, whitish pink; spire short, convex, obtuse; suture impressed; whorls three and a half, rapidly increasing, the last inflated, hyaline in front, rather narrow at the base, membranous margined; aperture scarcely oblique, lunate-rounded; peristome very thin, dextral margin regularly rounded, columellar receding, much arched. Lat. maj. 18, min. 14 alt. 10 mill.

*Vitrina bicolor*, *Beck, M.S.S.*

*Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii. 499.

*Hab.* Guimaras, Philippines.

(1337) *Vitrina guimarasensis*.

Shell depressed-sensiglobose, thin, striatulate,

subdiaphanous, greenish-pink; spire rather small, slightly elevated; suture margined; whorls scarcely four, nearly level, very rapidly increasing, the last inflated, subdepressed; aperture oblique, lunate-subcircular, as high as wide, slightly pearly within; peristome very thin, dextral margin regularly arched, columellar receding, much arched. Lat. maj. 15, min.  $11\frac{1}{2}$  alt 8 mill.

*Vitrina guimarasensis*, *Pfr. Proc. Zool. Soc.* 1848; *Mon. Helic.* ii 499.

*Hab.* Guimaras, Philippines.

(1338) *Vitrina Beckiana*.

Shell depressed-globose, circuit oval, very thin, striatulate, pellucid, bright, very pale rubelline-horny; spire moderate, short, obtuse; whorls nearly four, very slightly convex, rapidly increasing, the last subdepressed, wide at the base; aperture rather oblique, lunate rounded, wider than high; peristome simple, margins remote, regularly arched above, columellar slightly reflected above, receding at the base, much arched. Lat. maj. 16, min. 13, alt. 8 mill.

*Vitrina Beckiana*, *Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii. 499; *Icon.* t. 2. f. 37-39.

*Vitrina peraffinis*, *Beck. in Sched.*

*Hab.* Philippines.

(1339) *Vitrina politissima*.

Shell globose-depressed, rather solid, smooth, highly polished, diaphanous, horny, radiated more darkly; spire moderate, convex; suture impressed, submarginate; whorls four, slightly convex, rapidly increasing, the last rounded-depressed, wide at the base; aperture oblique, lunate, rounded, as high as wide; peristome simple, upper margin arched in front, columellar slightly arched. Lat. maj. 14, min. 11, alt.  $7\frac{1}{2}$  mill.

*Vitrina politissima*, *Beck. M.S.S.*

*Pfr. in Proc. Zool. Soc.* 1848, *Mon. Helic.* ii. 499, n. 21; *Mon. Helic. Icon.* t. 3. f. 12-14.

*Hab.* Zebu, Philippines.

(1340) *Vitrina Leytensis*.

Shell depressed, circuit oval, very thin, smooth, very bright, lutescent-pink; spire nearly level, scarcely elevated; suture lightly impressed; whorls three, rapidly increasing, the last nearly level above, more convex and rather wide at the base; aperture slightly oblique, rounded, lunar, wider than high; peristome very thin, upper margin scarcely arched, columellar slightly reflected above, forming an obtuse angle with the lower at the base. Lat. maj. 18, min.  $10\frac{1}{2}$ , alt. 7, mill.

*Vitrina Leytensis*, *Beck. M.S.S.*

*Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii. 500. n. 22; *Icon.* t. 8. f. 15-17.

*Hab.* Philippines.

(1341) *Vitrina margarita*.

Shell depressed-globose, very thin, striatulate, bright, pellucid, pinky-hyaline; spire rather small, nearly level; suture linear; whorls  $3\frac{1}{2}$ , near-

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ly level, rapidly increasing, the last large, inflated; aperture oblique, lunate-subcircular; peristome very thin, upper margin dilated in front, columellar lightly arched, Lat. maj 14, min 11, alt. 8 mill.

*Vitrina margarita*, Beck. M. S. S.

*Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii. 500; *Icon. t. 2. f. 34-35.*

*Hab.* Philippines.

(1342) *Vitrina gutta*.

Shell depressed-globose, very thin, quite smooth, bright, hyaline; spire very slightly elevated; suture linear, narrowly margined; whorls three and a half, nearly level, rapidly increasing, the last large, depressed-rounded, rather wider at the base; aperture slightly oblique, lunate-circular; peristome simple, regularly arched all round, columellar margin passing inwards, slightly reflected above. Lat. maj. 11, min.  $8\frac{1}{2}$ , alt. 6. mill.

*Vitrina gutta*, *Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii. 500, *Icon. t. 2. f. 25-27.*

*Hab.* Luzon, Philippines.

(1343) *Vitrina rufescens*.

Shell depressed-globose, very thin, plicatulate, bright, pellucid, rufescent; spire shortly conoidal, rather obtuse; suture impressed; whorls nearly four, slightly convex, rapidly increasing, the last ventricose; aperture scarcely oblique, lunate-sub-circular; peristome thin, subinflected, margins remote, the upper regularly, the columellar slightly arched. Lat. maj. 13, min. 10, alt. 8 mill.

*Vitrina rufescens*, *Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii. 501; *Icon. t. 6. f. 11. 18.*

*Hab.* Mindoro.

(1344) *Vitrina smaragdula*.

Shell slightly depressed, thin, scarcely striatulate, dull, diaphanous, golden-green; spire rather small, nearly level; suture slightly impressed, very narrowly margined; whorls three and a half, nearly level, rapidly increasing, the last subplanulate on each side, wide at the base; aperture scarcely oblique, rounded-lunar, wider than high; peristome thin, subinflected, upper margin dilated in front, columellar scarcely receding, slightly arched. Lat. maj. 12, min.  $9\frac{1}{2}$ , alt. 7 mill.

*Vitrina smaragdula*, Beck. M. S. S.

*Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii. 501.

*Hab.* Negros, Philippines.

(1345) *Vitrina crenularis*.

Shell depressed, very thin, glabrous, bright, pellucid, golden; spire plane; suture slightly impressed; whorls three and a half, nearly level, plicate crenulated at the suture, rapidly increasing the last depressed, wide at the base; aperture oblique, rounded-lunar, wider than high; peristome thin, slightly inflected, upper margin

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rather straight. Lat. maj. 13, min. 10, alt. 7 mill.

*Vitrina crenularis*, Beck. M. S. S.

*Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii. 501; *Icon. t. 3. f. 9-11.*

*Hab.* Philippines.

(1346) *Vitrina resiliens*.

Shell depressed, very thin, very finely and closely plicatulate, bright, pellucid, greenish straw-coloured; spire nearly level, suture slightly impressed; whorls three and a half, nearly level, the last wide, depressed, almost entirely membranous at the base; aperture oblique, lunate-oval; peristome quite simple, columellar margin extending firmly, slightly arched. Lat. maj. 11, min.  $8\frac{1}{2}$ , alt.  $6\frac{1}{2}$  mill.

*Vitrina resiliens*, Beck. M. S. S.

*Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii. 501.

*Hab.* Zebu, Philippines.

(1347) *Vitrinella flammulata*.

Shell depressedly globose, perforated, pellucid, fragile, smooth, fulvous, zoned with red flamelets; aperture semi-lunate, sinistral margin not inflected; whorls three and a half, slightly convex. Lat. maj. 6, min. 5 alt.  $3\frac{1}{2}$  lin

*Animal*: back of the mantle produced and covering the hinder part of the penultimate whorl.—*Vog. Astrol. t. 2. f. 3, 7; Gray, Fig. Moll. t. 71. f. 3*

*Helix flammulata*, Quoy & Gaim. *Astrol. Zool.* ii. 136. t. 11. f. 5. 7.

*Pfr. Mon. Helic.* i. 61.

*Vitrina flammulata*, Lam. ed. Desh. vii. 730 n 6.

*Nanina flammulata*, Gray. *Fig. Moll.* iv. 111.

*Pfr. Symp.* ii. 63.

*Hab.* Celebes.

(1348) *Vitrinella viridis*.

Shell solid, discoidal, strongly keeled, convex above, globose beneath, green; zoned with a yellow band; whorls four and a half, nearly plane; aperture simple, triangular; peristome simple, acute; umbilical fissure scarcely distinct. Lat. 9, alt. 6, lin.

*Animal*: mantle produced behind, covering the hinder part of the penultimate whorl.—*Vog. Astrol. t. 2, f. 16; Gray, Fig. Moll. t. 71. f. 1.*

*Vitrina viridis*, Quoy, & Gaim. *Astrol.* ii. 138. t. 11. f. 16-18.

*Lam. ed. Desh.* vii. 730. n 7.

*Nanina viridis*, Beck. *Ind.* 4.

*Gray. Fig. Moll.* iv. 111.

*Helix viridis*, *Pfr. Mon. Helic.* i. 32.

*Hab.* Celebes.

(1349) *Shells of Birmah and the Tenasserim Provinces.* By W. THEOBALD, Junior.

Mr. Theobald remarks as follows:—In the present paper it is my intention to give a sketch of the distribution of the land and fluviatile shells



been observed, in the hope that my notes may prove a not uninteresting addition to our previous knowledge of the subject, and shew by the great addition now made to the list of known species, how much yet remains to be done in this department of Natural History.

The names used are with scarcely an exception those furnished by Mr. Benson, who has described many of the new species in the *Annals and Magazine of Natural History* for 1857 though many still possess merely MSS. names, which, together with the new species described from specimens furnished by me, I have indicated in the following list, by asterisks (\*).

On my first communicating with Mr. Benson, he informed me that but twenty-three species of land shell were authentically known from the Tenasserim Provinces. Of these, four species, which escaped my notice, may here be mentioned to complete the list up to the present time, viz.

*Vitrina Birmanica*, Philippi.

*Bulinus moniliferus*, Gould.

*Cyclophorus perdix*, Sav.

*Leptopoma Birmanum*, Pfr.

*Vitrina Draparnaud*.

49. *V. Birmanica Philippi*, was not met with by me.

*Cryptosoma* (Theobald) *Vitrina* Præstans.

Gould. Moulmein.

*Vitrina*. Manantoddy.

*Vitrina gigas*. Sylhet.

(1350) *Helicarion aperta*.

Shell much depressed, slightly convex above, wide open at the base, smooth, subopaque, greenish-white; spire minute, lateral; suture smooth; whorls two and half, slightly convex, very narrow at the base, wide open, the last very large, smoothly vaulted; aperture horizontal, ear-shaped, open to the apex; peristome quite simple. Lat. maj. 11, min. 8, alt. 3 mill.

*Vitrina aperta*, Beck. MSS.

*Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii. 502.

*Hab.* Luzon, Philippines?

(1351) *Helicarion Ceylanica*.

Not described

*Vitrina Ceylanica*, Beck. *Index*, 2. n. 12; *Mus. R. O.* viii. t. 1. f. 3.

*Pfr. Mon.* ii. 503; *Id.* t. 6. f. 34-38.

*Hab.* Ceylon.

(1352) *Helicarion irradians*.

Shell depressed, with the periphery ear-shaped, thin, with crowded, arcuate, radiating impressed lines, obsoletely decussated with irregular spiral striae, diaphanous, scarcely shining, of a cinnamon horn-colour above; spire small, raised into a slight papilla; suture impressed, bordered; whorls nearly four, rather flat, enlarging rapidly, the last depressed, more convex beneath; aperture very oblique, lunate, nearly circular; peris-

regularly arched. Height  $3\frac{1}{2}$ , greatest breadth 184, least breadth 14 mill. (*Pfr.*)

Animal brown—*B. M.*

*Vitrina irradians*, *Pfr. in Proc. Zool. Soc.* 1851, *Mon. Suppl.* p. 3.

*Hab.* Ceylon.

*Asiatic animal unknown perhaps Vitrinae.*

(1353) *Helicarion papillata*.

Shell depressed, thin, nearly smooth, bright, pellucid, pale flesh-coloured; spire nearly level, papillated in the middle; suture deeply impressed, margined; whorls three and a half, slightly convex, striatulate near the suture, the last depressed, sometimes sculptured with obsolete spiral lines, periphery rounded, base rather wide; aperture very oblique, ample, rounded-lunar, wider than high; peristome thin, upper margin dilated above, columellar receding, much-arched. Lat. maj. 10, min. 8, alt. 5 mill.

*Vitrina papillata*, *Pfr. in Proc. Zool. Soc.* 1848, *Mon. Helic.* ii. 502.

*Hab.* Luzon Philippines.

(1354) *Helicarion planulata*.

Shell much-depressed, subdiscoidal, nearly smooth, bright, flesh-coloured; spire nearly level; suture impressed; whorls three, very slightly convex, very rapidly increasing, the last depressed, narrow at the base; aperture very ample, very oblique, lunar, transversely dilated; peristome thin, upper margin dilated in front, columellar far receding, arched. Lat. maj. 11, min. 8, alt.  $4\frac{1}{2}$  mill.

*Vitrina planulata*, *Pfr. in Proc. Zool. Soc.* 1848; *Mon. Helic.* ii. 502.

*Vitrina depressa*, Beck. MSS., not *Jeffr.*

*Hab.* Luzon, Philippines.

(1355) *Helicarion cassida*, Hutton, described in 1838, is one inch two lines in diameter, and an allied Abyssinian species equals it in size, Tenasserim Provinces.

*Succinea*. Amber-snail. *rec.* 68 sp. also fossil.

*Succinea*. Calcutta.

*Succinea crassinocula*. Jaffna.

*Succinea*. Island of Bombay.

*Succinea*. Calcutta.

*Succinea crassinocula*. Calcutta.

*Succinea Draparnaud*.

*S. semiserica*, Gould.—Tavoy. Tenasserim Valley. Not rare.

*S. (ined.)*—Rangoon. A small species, rather rare.

*Bulinus*.

*Partula*. *rec.* 52 sp.

*Gibbus* (Lyonnetianus). *rec.* 2 sp.

(1356) *Bulinus atricallosus*, Gould. Reeve has figured this species, but inclines to the opinion that it is a mere variety of *B. citrinus*. Pfeiffer enumerates it among the varieties of *B. perversa*, (*citrinus*), without any hesitation. The Pinang variety, with the ordinary aspect of the

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parietes of the aperture, confirms the opinion: Tenasserim Provinces.

<i>Bulimus reevei</i> .	Philippine Islands.
<i>Bulimus lignorius</i> .	Philippine Islands.
<i>Bulimus lignorius</i> , variety.	
<i>Bulimus lignorius</i> , variety?	Philippine Islands.
<i>Bulimus mus</i> .	Philippine Islands.
<i>Bulimus Bairdii</i> .	New Caladonia.
<i>Bulimus faunus</i> .	Philippine Islands.
<i>Bulimus Bengalensis</i> , variety.	Bombay.
<i>Bulimus Bengalensis</i> , variety.	Calcutta.
<i>Bulimus Bengalensis</i> , variety.	
<i>Bulimus citrinus</i> .	Singapore.
<i>Bulimus citrinus</i> variety.	
<i>Bulimus</i> , Koondapore on the road between.	Poona and Jauluah.
<i>Bulimus calista</i> .	Philippine Islands.
<i>Bulimus cœnopictus</i> .	Island of Bombay.
<i>Bulimus</i> .	India.
<i>Bulimus chrysalidiformis</i> .	Philippine Islands.
<i>Bulimus chrysalidiformis</i> , variety.	Philippine Islands.
<i>Bulimus lyonetianus</i> .	Mauritius.
<i>Bulimus pullus</i> , variety.	Sind.
<i>Bulimus ovoideus</i> .	Philippine Islands.
<i>Bulimus punctatus</i> .	Bombay.
<i>Bulimus</i> .	Island of Bombay.
<i>Bulimus indicus</i> .	Island of Bombay.
<i>Bulimus daphnis</i> .	Philippine Islands.
<i>Bulimus nimbosus</i> .	Philippine Islands.
<i>Bulimus dactylus</i> .	Philippine Islands.
<i>Bulimus perversus</i> , var. <i>atricullosus</i> , Gould.	Tenasserim Valley.
<i>Bulimus scindiars</i> .	
Benson.	Punjab.
<i>Bulimus pallus</i> , Gray.	Punjab, Ava.
<i>Bulimus punctatus</i> .	
Auton.	Mhow.
<i>Bulimus cœnopictus</i> .	
Hutton.	Jaholpur. (2 sp).

### *Bulimus. Scopli.*

*B. perversus*, var. *atricullosus*, Gould — *Tenasserim Valley*. Common. Dextral and sinistral shells occur in equal numbers.

*B. Janus*, Pfr.—Procured alive from dealers in Mergui, and said to come from the neighbourhood. Dextral and sinistral shells equally common:

*B. Theobaldianus*, B.—Yanglaw. Very rare.

*B. Putus*, B.—Akowtong. Rather rare.

*B. insularis*, Ehr.—Below Ava. Procured abundantly by Mr. Oldham.

*B. gracilis*, H.—A little shell which seems to be this species is common from Thait-mio to

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*B. moniliferus* Gould.—Not met with by me.

*Achatina*. Agate shell, rec. 120 sp. fossil, 14 sp.

*Sub genera*. *Achatinella* rec. 23 sp.

*Achatina fulica* Pfr.

Mauritiana, Lamarck. Ceylon.

*Achatina gemma*, Land

shell. Ceylon.

*Achatina*. Island of Bombay.

*Achatina nitens*. Ceylon.

(1357) *Achatina octona*. The shell alluded to under this name, or that of *octonoides* is *Achatina erecta*, Benson, of the Chusan series. There is a *Bulimus octonoides*, Adams, belonging to the group to which *B. gracilis*, Hutton, belongs, a shell very nearly allied to *Achatina erecta*. Tenasserim Provinces.

### *Achatina. Lamarck.*

*A. tenuispira*, B.—Thait-mio. Akowtong a slender var. of this Darjiling species is not uncommon at the roots of the Bamboo clumps near Akowtong.

*Pupa Chrysalis*-shell, rec. 160 sp.

*Pupa bicolor* Lands shells. Jaffna and Ceylon.

*Pupa*, new species. Ceylon.

*Pupa*, Land shell. Ceylon.

*Pupa*, Land shell. Ceylon.

*Pupa*, Land shell. Ceylon.

*Pupa*. Ceylon.

(1358) *Pupa mellita*, Gould. This small red shell may possibly be *P. bicolor*, Hutton, the animal of which, like many of the Mauritian *Pupa*, is yellowish and vermillion. *Pupa bicolor* I have taken from Calcutta up to the foot of the Himalaya in Rohilkbund, as well as at Galle in Ceylon, and Dr. Cantor took it at Pulo Tenasserim Provinces.

### *Pupa Lamarck.*

*P. bicolor*, Hutton. (*P. mellita*, Gould)—Thait-mio, Tavoy. This little species is widely spread, but nowhere abundant. It is very usually found in moist earth in company with *Bulimus gracilis*.

*Cylindrella brevis*, Pfr. Ceylon.

*Cylindrella hydrana*. Jamaica, Ceylon.

*Cylindrella*. Ceylon.

*Cylindrella agnesiana*,

Jam. Ad. ? Ceylon.

*Cylindrella elongata*. Ceylon.

*Cylindrella carnea* Jam.

Ad ? Ceylon.

*Cylindrella*. Ceylon.

*Cylindrella seminuda*,

Jam. Ad. ? Ceylon.

*Cylindrella*. Ceylon.

*Cylindrella alba*. Jam.

ad. Ceylon.

*Paxillus adversus*. Borneo.

*Clausilia*, rec. 200. sp.

fossil. 20. sp. Syn.



Clausilia loxostoma.	Sylhet.
Clausilia.	Ceylon.
Clausilia.	Ceylon.
Clausilia Philippiana.	
Pfr.	Moulmein.
Clausilia loxostoma.	
Benson.	Teria Ghat. (3 sp.)

*Clausilia Draparnaud.*

*C. insignis*, Gould.—Moulmein. Very rare. Tenasserim Valley. Not common.

*C. Philippiana*, Pfr.—Moulmein, Tenasserim Valley. Very common.

(1359) *Clausilia insignis*, Gould.—The species sent under this name is very distinct from the species from Malacca, which I have described in Ms. as *C. stylus*, and which I find in Mr. Cuming's collection under the name of *chinensis* from Java. Possibly this name may be intended for *cochin-chinensis*, Philippi, the description of which I have not seen, and which appears to be recognized as distinct by Pfeiffer, from *C. insignis*, Gould. In May 1847, in referring to the Mergui *Clausilia philippiana*, he says; "mit *C. insignis*, Gould, nahe verwandt," a circumstance which, however, I cannot well understand, as *C. Philippiana* has only six whorls, and the specimen of *insignis* sent has nine. *Clausilia insignis* differs altogether from *C. stylus* in its smooth sculpture, its greater ventricosity, more blunted apex, the form of the mouth and the number and disposition of the plica in the interior. Tenasserim Provinces.

## Family II. Limacidæ. Slugs.

Genera. *Limax*. Slug, *rec.* 22 sp. also *fossil*.

*Incilaria*. *Syn.* *Meghimatium*. *rec.*

## Family III. Onchidiadæ.

Genera. *Onchidium*. *rec.* 16 sp.

*Vaginulus*. *rec.* 6 sp. *Syn.* *Veronicella*.

## Family IV. Linnæidæ.

Genera. *Linnæa*. Pond-snail, *rec.* 50 sp. *fossil*. 70 sp. *Sub-genus.* *Amphipeplea*. *rec.*

*Linnea chlamys*. Sylhet.

*Linnea chlamys*, variety? Calcutta.

*Linnea chlamys* variety? Calcutta.

*Linnea*. Island of Bombay.

*Linnea*. Island of Bombay.

*Physa*. *Syn.* *Bulin*. *Rivicola*. *Isidora*, *rec.* 20 sp. *fossil*. 14 sp.

*Ancylus*. River-limpet, *rec.* 14 sp. *fossil*. 8 sp. *fossil*. 2. sp.

*Latia* (*neritoides*). *rec.*

*Planorbis*. *Syn.* *Coret* *rec.* 60 sp. *fossil*. 60 sp.

*Planorbis Indicus*.

*Planorbis Indicus*, variety, Ceylon.

*Planorbis*, Fresh water tank shell. Ceylon.

There is a species of *Planorbis* or shell allied to *Planorbis* found here in pools of fresh water, being the only species of Singapore shell that is found solely in fresh water; the outer whorl is little more than a quarter of an inch in diame-

ter, aperture of the shell more diagonal than is usual in *Planorbis* so that when the animal moves on a plain surface the convex side of the shell is always uppermost whereas the animal of *Planorbis* is described as carrying its shell erect or with the diameter perpendicular; colour of the shell pale amber, no operculum, animal nearly black, mouth vertically cleft, no perceptible neck, (in the animal of *Planorbis*, the neck is said to be elongated) eyes at the base of two blunt tentacula in which also it differs from *Planorbis* which is commonly described and figured as having two subulate tentacula; the animal possesses in a considerable degree, the power of gliding through the water, apparently in search of food, with its shell entirely submerged and its smooth foot in close opposition with the surface of the water, locomotion being effected, by causing the flat part of the shell to act on the water in the manner of a fin, the head of the animal being at the same time directed forward so as to regulate its movements; the animal does not occupy so much as half the shell, and the remaining space frequently contains air, which the inhabitant has the power of expelling at pleasure.

## Family V. Auriculidæ.

Genera. *Auricula*. *Syn.* *Cassidula* *Marinula*. *Geovula*. *rec.* 50 sp. *fossil*. 20 sp.

*Auricula*. Ceylon, also, Calcutta Sunderbuns.

*Auricula midæ*. *A. myosotis*.

*A. minima*.

*A. scarabæus* and six others.

*A. judæ*.

*Auricula*. *Lamarck*,

*A. dactylus*, Pir.—Mergui, Not common. In Mangrove swamps.

*A. glans*, B.—Amherst. At the mouth of the Salween or Moulmein river. Rare.

*Scarabæus Bornense*.

*Sub-genera.* *Polydonta*, *rec.* 20 sp.

*Pedipes*. *rec.* also *fossil*. 5 sp.

*Conovulus* or *melampus*. Ceylon.

*Conovulus* or *melampus*

*pedipes*. Ceylon.

*Melampus pusillus*. Ceylon.

*Conovulus*. Labuan.

Section b. operculata

Family vi. *Cyclostomidæ*.

Genera. *Cyclostoma*. *Syn.* *Leonia*. *Lithidion*, *rec.* 80 sp. *fossil*. 20 sp.

*Cyclostoma aquilum*. Burmah.

*Cyclostoma*. Mataran.

*Cyclostoma*. Chittagong.

*Cyclostoma semistriatum*? Poonah.

*Cyclostoma tuba*. Malacca.

*Cyclostoma stenomphalum*. Bombay.

*Cyclostoma sericatum*. Island of Daat, near Labuan.



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<i>Cyclostoma sericatum</i> , Island of Daat, near Labuan variety.	
<i>Cyclostoma vitrea</i> .	Island of Pappan, near Labuan.
<i>Cyclostoma</i> .	Western India.
<i>Cyclostoma volutus</i> ?	Tenasserim.
<i>Cyclostoma semisulcatum</i> .	Malacca.
<i>Cyclostoma involvulus</i> .	Ceylon.
<i>Cyclostoma involvulus</i> , variety.	Ceylon.
<i>Cyclostoma Borneense</i> .	
<i>Cyclostoma</i> .	Pegu.
<i>Cyclostoma perdix</i> .	Singapore.
<i>Cyclostoma</i> .	Sylhet.

### *Crylosoma Mihi, n. g.*

Testa vitrine simile, sed robustiore. Peristomate obtuso haud tenue. Animale penitus intra testam retractile, et in aestivationis tempore, solido epiphragmate oblecto.

*C. præstans*, (*Vitrina præstans*) Gould.—Moulmein, Martaban, Tenasserim valley.—I have separated this shell from *Vitrina*, as the animal is perfectly retractile, and the peristome is thicker than in *Vitrina* proper, and not membranous. It is common in holes in laterite at Martaban and not rare throughout the Tenasserim Valley. Its colour is a bay olive Cajiput green.

<i>Cyclostoma</i> .	Singapore.
<i>Cyclostoma</i> .	India.
<i>Cyclostoma</i> var:	India.
<i>Cyclostoma</i> .	Prome.
<i>Cyclostoma cornu-venatorium</i> .	Ceylon.
<i>Cyclostoma cornu-venatorium</i> , variety.	Ceylon.
<i>Cyclostoma</i> .	India.
<i>Cyclostoma</i> .	Darjeeling.
<i>Cyclostoma</i> .	Tenasserim valley.
<i>Cyclostoma maritimum</i> .	
Land shell.	Ceylon.
<i>Cyclostoma</i> .	Ceylon.
<i>Cyclostoma</i> .	Jaffna.
<i>Cyclostoma</i> .	Ceylon.
<i>Cyclostoma bi-rostre</i> .	Borneo.
<i>Cyclostoma pterocyclos</i> ?	
Taylorianum.	Borneo.

(1360) *Cyclostoma pernobile*, Gould.—Pfeiffer notes this shell as a synonym of *C. aurantiacum*. Schumacher (nec Sowerby), a near ally of *C. perdix*, Sowerby, and places both shells in the Sub-Genus *Cyclophorus*, Montf Pfeiffer observes; "Ein prachtiges *Cyclostoma*, welches Hr. Dr. Philippi zugleich mit den oben (154) erwähnten von seiner Reise mitgebracht hat, bestätigt vollständig meine früher ausgesprochene Vermuthung, dass *C. pernobile*, Gould, von Tavoy, dieselbe, Art sey, welche Chemnitz abgebildet, und Schumacher *Annularia aurantiaca* genannt hat. Jenes ist in Mergui gesammelt worden

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leren Färbung, völlig der Beschreibung und Abbildung von Chemnitz, so wie auch der Beschreibung von (Gould zwar ist der Kiel an dem vorliegenden Exemplar um ein Geringes weniger schar, als bei der Abbildung von Gould) wir wissen aber wie veränderlich dieser character gerade bei dieser Gruppe ist, und so dürfte bei der Identität des Vaterlands kein Zweifel mehr über diese ausgezeichnete Art Statt finden, welche zwar von Muller und Chemnitz mit *C. volutus* zusammengeworfen wird, aber jedenfalls ihre spezifische selbständigkeit zu behaupten im stande ist." Tenasserim Provinces.

(1361) *Cyclostoma sectilabrum*, Gould.—Pfeiffer refers this shell, as well as *C. croceum*, to Guilding's Sub-Genus *Megalomastoma*. It is quite distinct from *C. croceum* which belongs besides to the Mauritius. Pfeiffer says under the head of *Cyclostoma croceum*. "die von Gould ausgesprochene Vermuthung dass die Art mit seinem *C. sectilabrum* zusammenfallen werde, sich wohl als ungegründet erweisen dürfte, durchaus nicht vorhanden sind." Tenasserim Provinces.

### (1362) *Cyclostoma cuspidatum*.

Shell umbilicated, conoidal, acuminate, obliquely striated, marked with spiral lines; peristoma olivaceous-fuscous; spire elongated, slender, with the apex nipple-shaped; whorls 5, the first ones convex, the two last rather convex above, furnished with a single sidge, the last one convex beneath, keeled on the periphery, marked with three ridges beneath the keel and the umbilical ridge being crenulate; aperture very oblique, nearly circular, slightly angulated above; peristome thin, sharp, with the columellar margin slightly expanded; umbilicus middle-sized, deep, showing more than one whorl Opérculum? Height 4, greatest breadth 6, least br. 5 mill. (Pens.)

*Cyclostoma cuspidatum*, Benson in *Ann. and Mag. N. H.* viii. p. 189; *Pfr. Consp.* n. 466; *Pneum. Mon.* p. 313; *Id.* n. 407, t. 49, f. 21-23, *Hab.* The Neilgherries Mountains (Cerdon).

### (1363) *Cyclostoma? marginatum*.

Shell white subovate, wrinkled, perforate, with the whorls transversely margined and striated. (Chemn.)

*Turbo marginatus*, Chemn. *Conch.* ix. 2, p. 60, t. 123, f. 1076, a.

*Turbo limbatus*, Gmel. *Syst.* p. 3606, n. 105. *Cyclostoma murrhinum*, Menke. *Synops.* ed. ii. p. 39.

*Cyclostoma marginatum*, *Pfr. Consp.* n. 467; *Pneum. Mon.* p. 313.

*Hab.* Coromandel.

### (1364) *Cyclostoma sarritum*.

Shell subperforate, ovate-conic, furnished with numerous spiral lines, which are separated by



apex blunt, reddish; suture well impressed; whorls 4, very convex; aperture scarcely oblique ovate, forming  $\frac{2}{3}$  of the total length; peristome sharp, slightly expanded, with the margins distant, joined by callus, columellar margin angulated above. Length 2, breadth  $1\frac{1}{4}$  mill. (Bens.)

*Cyclostoma sritum*, Benson in Ann. and Mag. N. H. viii. p. 188, Pfr. Consp. n. 469; Pneum. Mon. p. 314.

Hab. Cherra Ponjee, India.

*Hypsclostoma*. Benson.

*H. tubiferum*, B.—Thaïet-mio. This singular little anostomatous shell was only met with at one spot on limestone rocks near the Coal mines, where it did not seem very rare.

(1365) *Cyclostomus Cuvierianus*.

Shell depressed, decussated by close-set longitudinal and more crowded spiral lines, grayish-fulvous; spire little raised; whorls 5-6, the upper ones convex, the following flattened, with one lamellar keel, the last one slightly convex above; furnished at its periphery with two distant sharp lamellar keels and numerous sharply-raised spiral ridges round the wide and open umbilicus; aperture oblique, rather circular, fulvous within; peristome white, broadly expanded, with the margins joined by rather thick callus, right margin showing two channels, columellar margin dilated and expanded above. Height 32, greatest breadth 64, least br. 54 mill.

*Cyclostoma Cuvieriana*, Petit, in Revue Zool. 1841, p. 134; Mag. Zool. 1842. t. 55.

*Cyclostoma Cuvierianum*, Reeve. Conch. Syst. t. 104, f. 14, t. 185, f. 24; Sow. Thes. n. 72. p. 115, t. 30, f. 218, 219; Philippi, Abbild. i. 5, p. 103, t. 1. f. 1; Pfr. Ic. n. 1, p. 9, t. 1, f. 1-4.

*Tropidophora Cuvieriana*, Pfr. in Z. f. M. 1847, p. 106, n. 1; Gray, Cat. Cycl. p. 37, n. 1.

*Cyclostomus Cuvierianus*, Pfr. Consp. n. 175; Pneum. Mon. p. 189.

Smaller, with the columellar margin of the peristome much dilated over the umbilicus; height 22, greatest breadth 37, least br. 32 mill.

Hab. Madagascar, and Nosibe.

(1366) *Cyclostomus formosus*.

Shell depressed trochiform, rather solid, furnished with three sharp keels, with the interstices decussated by raised spiral and more crowded transverse lines, fulvous-brownish, articulated with white on the keels and near the suture; spire stair-like, rather acuminate; whorls 5, flattened, the upper with one keel, the last one large, crowdedly spirally grooved below the third keel; umbilicus funnel-shaped; aperture diagonal, rather circular; peristome simple, with the margins joined by a thin emarginate callus, right margin expanded, showing two channels, columellar margin narrowly reflected. Height 23, greatest breadth 42, least br. 34 mill.

1849, p. 13; Moll. t. 2. f. 8, 9; Pfr. Ic. n. 231 t. 32, f. 1, 2.

*Tropidophora carinata* var., Gray Cat. Cycl. p. 39.

*Cyclostomus formosus*, Pfr. Consp. n. 275; Pneum. Mon. p. 190.

Hab. Madagascar.

(1367) *Cyclostomus cariniferus*.

Shell depressed, rather discoidal, trellised by distinct striae of growth and very numerous raised keels, and crowded spiral lines, fulvous-brownish, with a single darker band below the periphery; spire scarcely raised, slightly mucronate; whorls 5, moderately convex, enlarging rapidly, depressed along the suture; umbilicus wide; aperture little oblique, nearly circular; peristome fulvous, slightly thickened, shortly expanded, with the margins joined by a callus, which is produced upwards, columellar margin dilated, rather reflected. Height 17, greatest breadth 40, least br. 32 mill.

*Cyclostoma cariniferum*, Sow. Spec. Conch. f. 197, 198; Reeve. Conch. Syst. t. 185, f. 23; Sow. Thes. n. 69, p. 114, t. 25, f. 93; Pfr. Ic. n. 152, p. 144, t. 19, f. 13 15.

*Cyclophorus? cariniferus*, Pfr. in Z. f. M. 1847, p. 108, n. 25; Gray. Cat. Cycl. p. 21, n. 25.

*Cyclostomus cariniferus*, Pfr. Consp. n. 277; Pneum. Mon. p. 191.

Smaller, with very numerous fainter keels, with the peristome reddish-orange-coloured; height 16, greatest breadth 36, least br. 28 mill.

*Cyclostoma spectabile*, Petit, in Journ. Conch. 1850, i. p. 46; t. 3, f. 2.

Hab. Madagascar, the variety from Nosse Faly, near Nosse Be (Guillair).

(1368) *Cyclostomus articulatus*.

Shell orbiculate-conoidal, solid, pale flesh-coloured, furnished with numerous keels, two or three of which are stronger and articulated with brown; spire broadly conoidal, with the apex rather blunt; whorls 5, moderately convex, rather angulated, increasing rapidly, the last one rather flattened below the peripheral keel, painted with a single brown band, grooved crowdedly and deeply, separated by a broader keel from the umbilicus, which is middle-sized, funnel-shaped, coarsely furrowed; aperture rather oblique, nearly circular, fulvous within; peristome slightly thickened, straight, with the margins joined by a short lunar-shaped indented callus, right margin sinuate above. Height 18, greatest breadth 28, least br. 24 mill.

*Cyclostoma articulata*, Gray in Griff. Anim. Kingd. t. 28, f. 1.

*Cyclostoma filsum*, Sow. Spec. Conch. f. 16, 17; Zool. of Beech. Voy. p. 146, t. 38, f. 31; Reeve, Conch. Syst. t. 184, f. 16; Sow. Thes. n. 16, p. 96, t. 22, f. 14; Pfr. Ic. n. 144, p. 137,

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*Cyclostoma Terveriana*, Grateloup, in *Act. Soc. Linn. Bord.* xi. p. 439, t. 3, f. 8.

*Cyclophora articulata*, Swans. *Mal.* p. 336.

*Tropidophora filosa et Terveriana*, Pfr. in *Z. f. M.* 1847, p. 106.

*Tropidophora articulata et Terveriana*, Gray, *Cat. Cycl.* p. 38, 42.

*Cyclostomus articulatus*, Pfr. *Consp.* n. 178; *Pneum. Mon.* p. 11.

*Hab.* East India (Sowerby), Madagascar (Grateloup), Island of Rodriguez, near Mauritius (Benson).

(1369) *Cyclostomus Deshayesianus*.

Shell depressed, solid, sculptured above with numerous, alternately sharply raised keels, with the interstices very minutely decussated, opaque, reddish-orange-coloured; spire shortly turbinate, with the apex rather nipple-shaped, whorls 5, convex, enlarging rapidly, the last one descending, with a sharper compressed peripheral keel, convex beneath and closely spirally striate; umbilicus middle-sized; aperture very oblique, rather circular; peristome indistinctly double; inner edge callous, blunt, white; outer edge thickened, expanded angularly, produced forward and dilated above, affixed. Height 11, greatest breadth 22, least br. 19 mill.

*Cyclostoma Deshayesianum*, Petit. in *Rev. Zool.* 1843, p. 3; *Mag. Zool.* 1844, t. 98; Pfr. *Ik.* n. 192, p. 175, t. 25, f. 8-10; Sow. *Thes. Suppl.* n. 191, p. 164\*, t. 31 B, f. 326, 327.

*Cyclostoma gratum*, Ferruss. *Muss.*

*Tropidophora Deshayesiana*, Pfr. in *Z. f. M.* 1847, p. 106, n. 6.

*Tropidophora Cuvieriana* var., Gray, *Cat. Cycl.* p. 38.

*Cyclostomus Deshayesianus*, Pfr. *Consp.* n. 279; *Pneum. Mon.* p. 192.

*Hab.* The Northern part of Madagascar.

(1370) *Cyclostomus Abeillei*.

Shell orbiculate, rather trochiform, umbilicate, five keeled, transversely furrowed, whitish, with dark bands or yellowish spots; umbilicus deep; spire short, pointed; whorls 5: aperture rather circular; lips sharp, slightly reflexed. Height 16-17, breadth 20 mill.

*Cyclostoma Abeillei*, Grateloup, in *Act. Soc. Lin. Bord.* xi, p. 437, t. 3, f. 6.

*Tropidophora Abeillei*, Pfr. in *Z. f. M.* 1847, p. 106, n. 3; Gray, *Cat. Cycl.* p. 42, n. 19.

*Cyclostomus Abeillei*, Pfr. *Consp.* n. 280; *Pneum. Mon.* p. 193.

*Hab.* Madagascar.

(1371) *Cyclostomus modestus*.

Shell depressed, rather solid, slightly striate, with numerous spiral ridges and three sharper keels, brownish-white; spire flat; whorls 4, depressed, united by a channelled suture, the last convex beneath; umbilicus

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ristome white, with the margins approximate, joined by thin callus, right margin sinuate above, vaulted and expanded, angulated by the ends of the keels, columellar margin narrow, scarcely reflected. Height 9, greatest breadth 24, least br. 19 mill.

*Cyclostoma modestum*, Petit. in *Journ. Conch.* 1850, i. p. 50, t. 4, f. 2; Pfr. *Ik.* n. 333, t. 42, f. 16-18.

*Cyclostomus modestus*, Pfr. *Consp.* n. 281; *Pneum. Mon.* p. 193.

*Hab.* The Island of Abd-el Goury.

(1372) *Cyclostomus bicarinatus*.

Shell globose-conical, rather thin, closely but faintly spirally grooved, bicarinated, brownish gray; spire pyramidal, with the apex usually truncated; whorls 6, angulated, the last one girdled with two pale, acutely-raised keels, deeply spirally furrowed beneath; aperture rather vertical, nearly circular, shining blackish-blood-red within; peristome simple, expanded, purplish-blood-red, with the margins nearly continuous, columellar margin dilated above into a tongue shaped, vaulted lamina, which nearly altogether closes the umbilicus. Length 35, breadth of the penultimate whorl 23 mill.

*Cyclostoma bicarinatum*, Sow. *Thes.* n. 85, p. 120, t. 26, f. 121; Pfr. *Ik.* n. 147, p. 139, t. 19, f. 1-3; Desh. *Traité. elem. Conch.* t. 82, f. 1, 2.

*Tropidophora bicarinata*, Pfr. in *Z. f. M.* 1847, p. 106, n. 9.

*Tropidophora tricarinata* var., Gray, *Cat. Cycl.* p. 39.

*Cyclostomus bicarinatus*, Pfr. *Consp.* n. 284; *Pneum. Mon.* p. 165.

Smaller, with the umbilicus rather open; length 24, breadth 17 mill.

*Hab.* Madagascar.

(1373) *Cyclostomus tricarinatus*.

Shell top-shaped, acuminate, pale with indistinct yellow transverse stripes and spiral striæ; whorls 5, marked with very numerous convex spiral ridges and three stronger raised sharp keels; aperture dilated, nearly circular; peristome dilated, white, with sharp margins, left margin produced, not altogether covering the perforated axis. Breadth 11 lin.

*Helix tricarinata* Müller. *Hist. Verm.* ii. p. 84, n. 282; Chemn. *Conch. Cab.* ix. P. II, p. 85, t. 126, f. 1103, 1104; Gmel. *Syst.* p. 3621, n. 34.

*Turbo carinatus*, Wood. *Ind.* t. 22, f. 125.

*Cyclostoma tricarinata*, Lam. *Hist.* vi. p. 144, n. 6. Ed. Desh. viii. p. 355.

*Cyclostoma tricarinatum*, Pfr. *Ik.* t. 4, f. 16, 17 (excluding the description, and t. 3, f. 8).

*Tropidophora tricarinata*, Pfr. in *Z. f. M.* 1847, p. 106, n. 12; Gray, *Cat. Cycl.* p. 42, n. 20.



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*Cyclostomus tricariniatus*, *Pfr. Consp.* n. 287; *Pneum. Mon.* p. 197.

*Hab.* Madagascar.

(1374) *Cyclostomus deliciosus*.

Shell globose-turbinate, rather thin, striate, furnished on the middle with three sharp and several smaller keels, cinnamon-coloured; spiral turbinate, with the apex rather pointed; whorls  $5\frac{1}{2}$  angulated, convex, the last one moderately convex above, and marked with several raised lines, more convex beneath, with rather crowded spiral ridges surrounding the umbilicus, which is middle sized funnel shaped; aperture oblique, ovate; peristome simple, with the margins approximate, joined by thin callus; right margin expanded, columellar margin reflexed. Height 17, greatest breadth 23, least br. 18 mill.

*Cyclostoma deliciosum*, *Ferussac, Mus. Sow. Thes. Suppl.* n. 186, p. 162\*, t. 31, B. f. 314, 315; *Pfr. Ic.* n. 239, t. 34, f. 19, 20.

*Cyclostomus deliciosus*, *Pfr. Consp.* n. 290; *Pneum. Mon.* p. 199.

*Hab.* Madagascar.

(1375) *Cyclostomus Michaudi*.

Shell globose-conical, solid, slightly striate, girdled with 7-8 more or less prominent, rather sharp keels, greyish or pale violaceous; spire conical, often truncate; whorls 6, convex, the last one separated by a very strong keel from the umbilicus, which is funnel-shaped, scarcely pervious, deeply spirally grooved within; aperture rather circular; peristome whitish, shortly expanded, crenulated, with the margins joined by a white callus, columellar margin dilated, thickened, slightly reflexed, concealing the perforation, indistinctly channelled by the basal keel. Length 30, breadth 21 mill.

*Cyclostoma Michaudi*, *Grateloup, in Act. Soc. Linn. Bord.* xi. p. 440, t. 3, f. 11; *Pfr. Ic.* n. 145, p. 138, t. 18, f. 18—16.

*Cyclostoma carinatum*, *Sow. Thes.* n. 88, p. 119, t. 26, f. 117, (not f. 118). Not *Börn.*

*Tropidophora Michaudi* *Pfr. in Z. f. M.* 1847, p. 106, n. 13.

*Otopoma Michaudi*, *Gray. Cat. Cycl.* p. 37, n. 10.

*Cyclostomus Michaudi*, *Pfr. Consp.* n. 291 *Pneum. Mon.* p. 200.

*Hab.* Madagascar (Grateloup.)

(1376) *Cyclostomus Barclayanus*.

Shell globose-conical, solid, slightly striate and furnished with numerous sharply-raised keels, violaceous-brownish, varied with darker and paler streaks; spire conical, with the apex blunt, often truncate; whorls 5, little convex, the last one bearing three stronger, more prominent keels, the largest of which is on the periphery, the second on the base, the third on the upper side; aperture nearly perpendicular, rather circular, greyish-blood-red

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within: peristome blood red, slightly, thickened expanded, lunarly, emarginated on the penultimate whorl, with the right margin scalloped by the keels, columellar margin vaulted and reflected, almost covering the perforated axis. Length 29, breadth 23, mill.

*Cyclostoma Barclayanum*, *Pfr. in Proc. Z. S.* 1851; *Ic.* n. 222, t. 32, f. 3, 4.

*Cyclostoma carinatum*, var., *Sow. Thes.* t. 26, f. 118.

*Cyclostomus Barclayanus*, *Pfr. Consp.* n. 292, p. 62; *Pneum. Mon.* p. 200.

*Hab.* Isle de France (Sir David Barclay).

(1377) *Cyclostomus rugosus*.

Shell globose-turbinate, solid very faintly and crowdedly furrowed spirally, slightly shining, rose-flesh-coloured; spire conoidal, with the apex fulvous, rather blunt; whorls 5, convex, the last furnished above with about six raised keels, and with a single chestnut coloured band below the periphery; umbilicus funnel-shaped, deeply and closely grooved within; aperture rather perpendicular, ovate, roundish, fulvous inside; peristome whitish, slightly thickened and expanded, with the margins joined by a lunar-shaped intended callus, columellar margin angularly dilated, expended. Height 24, greatest breadth 28, least br. 23 mill.

*Cyclostoma rugosa*, *Lam. Hist.* vi. p. 145, n. 8; *Ed. Desh.* viii. p. 356; *Delessert, Recueil.* t. 29, f. 7; *Pfr. Ic.* t. 21, f. 15, 16 (from *Deless.*); *Chenu, Ill. Conch.* t. f. 7.

*Cyclostoma cinctum*, *Sow. Thes.* n. 107, p. 129, t. 23, f. 199; *Pfr. Ic.* n. 149, p. 141, t. 19, f. 6, 7.

*Tropidophora rugosa*, *Gray. Cat. Cycl.* p. 41, n. 14.

*Cyclostomus rugosus*, *Pfr. Consp.* n. 294; *Pneum. Mon.* p. 202.

*Hab.* East India (Sowerby).

(1378) *Cyclostomus Creplini*.

Shell globose-conical, solid, very faintly striate, silk-shining, straw-yellow or pale fuscous, spotted and striped with chestnut colour, furnished with numerous keels, which are rather equal, equidistant, sharp (about 12 on the last whorl), rather blunt and more crowded in the narrow umbilicus; spire conical, blunt; whorls 5, turgid, angulated; aperture slightly oblique, roundish, slightly angulated; peristome shortly interrupted, indistinctly double, thickened, flesh-coloured whitish, expanded and reflected, angularly dilated above; columellar margin vaulted and dilated. Height  $15\frac{1}{2}$ , greatest breadth 19, least br.  $15\frac{1}{2}$  mili.

*Cyclostomi Creplini*, *Dunker. in Z. f. M.* 1843 p. 177; *Pfr. Ic.* n. 278, t. 38, f. 13-15.

*Cyclostomus Creplini*, *Pfr. Consp.* n. 296. *Pneum. Mon.* p. 202.

*Hab.* Zanzibar, East Africa (Bodatz).

(1379) *Cyclostomus pulcher*.

Shell perforated, turbinate, rather solid, rough-

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ly sculptured with longitudinal raised lines and numerous unequal keels, blackish-fuscous, with pale or reddish, with dark streaks; whorls 5, convex, with a single indistinct pale band, equally keeled beneath; aperture rather-perpendicular, ovate-roundish, equally coloured within; peristome simple, with the margins joined into a slight angle; columellar margin somewhat reflexed, not concealing the narrow umbilicus. Height 14, greatest breadth  $16\frac{1}{2}$ , least br.  $14\frac{1}{2}$ , mill.

*Cyclostoma pulchra*, Gray, in Griff. Ann. Kingd. t. 28, f. 3.

*Cyclostoma ortyx*, Valene. MSS.; Eydoux in Guer. Mag. 1838, t. 117, f. 2.

*Cyclostoma ortyx*, Sow. Thes. n. 24, p. 99, t. 23, f. 27, 28, Pfr. Ic. n. 137, p. 131, t. 16, f. 13, 14.

*Cyclostoma multicarinata*, Jay. Catal. 1839, p. 122, t. 7, f. 7, 2.

*Cyclostoma Arthuri*, Grateloup in Act. Soc. Linn. Bord. xi. p. 438, t. 3, f. 7-12.

*Cyclophora pulchra*, 2 Swain. Malac. p. 336, (from the figure in Griff.)

*Tropidophora ortyx*, Pfr. in Z. f. M. 1847, p. 107, n. 14.

*Tropidophora pulchra*, Gray. Cat. Cycl. p. 38, n. 4.

*Cyclostomus pulcher*, Pfr. Consp. n. 296; Pneum. Mon. p. 203.

Hab. The Seychelle Islands.

(1880) *Cyclostomus castaneus*.

Shell globose-conical, thin, obliquely slightly striate, and sculptured with numerous rather sharp spiral ridges, shining, dark chestnut coloured; spiral raised conical rather blunt; whorls  $4\frac{1}{2}$  angularly convex, the last one beset with six nearly equal ridges, and with a greater number of very crowded spiral striae within the narrow umbilicus; aperture little oblique, nearly circular; peristome simple, thin, with both margins expanded, approximate, not united. Height 9, greatest breadth 11, least br. 9. mill.

*Cyclostoma castaneum*, Pfr. in Proc. Z. S. 1851. Ic. n. 387, t. 42, f. 25, 26,

*Cyclostomus castaneus* Pfr. Consp. n. 298, p. 63, Pneum. Mon. p. 204.

Hab. Madagascar.

(1881) *Cyclostomus ? trochlea*.

Shell narrowly umbilicated, pyramidally turreted, smooth, whitish; apex rather blunt; suture impressed: whorls 5, angularly convex, with one keel on the upper side, last whorl furnished with three keels, one above, the second about the middle and the third round the pervious umbilicus; aperture oblique, circular, forming two-sevenths of the total length; peristome sharp, scarcely angulated at the termination of the lower keel. Length 3, breadth 2 mill.

*Cyclostoma trochlea*, Benson. in Ann. and Mag. 1851, viii. p. 189; Pfr. Ic. n. 410 t. 49, f. 29, 30.

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*Cyclostomus trochlea* Pfr. Consp. n. 300; Pneum. Mon. p. 205.

Hab. The Neilgherries Mountains (Jerdon).

(1882) *Cyclostomus Madagascariensis*.

Shell globose turbinate, solid, rather smooth, sculptured with obsolete raised lines, opaque, flesh-coloured, painted with unequal violaceous band; spire turbinate, rather pointed; whorls 6, convex, increasing rapidly, the last one whitish above, marked with a single peripheral keel, convex beneath, grooved spirally within the umbilicus, which is wide, rather funnel-shaped, aperture little oblique, nearly circular, shining and blackish within; peristome simple, orange-red, with a pale edge, bell-shaped, expanded, arcuately emarginated on the penultimate whorl. Height 27, greatest breadth 39, least br. 31 mill

*Cyclostoma Madagascariensis*, Gray, in Griff. Ann. Kingd. t. 28, f. 4.

*Cyclostoma Duisabonis*, Grateloup in Act. Bord. xi. p. 435, t. 3, f. 2.

*Cyclostoma obsoletum*, var., Sow. Thes. t. 27, f. 125.

*Cyclostoma Madagascariense*, Sow. Thes. Suppl. n. 117, p. 157\*, t. 31, A, f. 289; Pfr. Ic. n. 287 t. 39, f. 1, 2.

*Cyclophora Madagascariensis* Swains. Malac. p. 336.

*Tropidophora tricarinata* var., Gray, Cat. Cycl. p. 39, and Tr. Duisabonis, Gray, Ic. p. 42, n. 17.

*Cyclostomus Madagascariensis*, Pfr. Consp. n. 301; Pneum. Mon. p. 205.

Hab. Madagascar.

(1883) *Cyclostomus unicarinatus*.

Shell depressed-turbinate, rather thin, faintly-striate spirally, flesh-coloured, marbled with fuscous or banded with chestnut colour; spire conical, rather point; whorls  $5\frac{1}{2}$ , convex, the last violaceous anteriorly, furnished, in the middle, with a single compressed, sharp keel, crowdedly grooved round the umbilicus; aperture rather oblique, nearly circular, very shining, purplish within; peristome simple, rofous, orange coloured or white, bell-shaped, expanded, with the margins joined by a lunarly indented, callus, upper margin much dilated, columellar margin reflexed. Height 20, greatest breadth 34, least br. 27 mill.

*Cyclostoma unicarinata*, Lam. Hist. vi. p. 144, n. 5,; Ed. Desh. viii, p. 355; Encycl. Meth. t. 461, f. 1; Desh. in. Enc. Meth. ii. p. 40, n. 4.

*Cyclostoma fulvifrons*, Sow. Spec. Conch. f. 122; Reeve. Conch. Syst. t. 185, f. 20.

*Syclostoma unicarinatum*. Sow. Thes. n. 84, p. 120 t. 26, !, 120, Pfr. Ic. n. 191, p. 174, t. 25 f. 7 from (Sowerby.)

*Cyclophora unicarinata*, Swains. Malac. p. 336,

*Tropidophora unicarinata*, Pfr. in Z. f. M. 1847, p. 106, n. 4.



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*Tropidophora tricarinata* var., *Gray, Cat. Cycl.* p. 39.

*Cyclostomus unicarinatus*, *Pfr. Consp. n.* 302.  
*Pneum. Mon.* p. 206.  
*Hab.* Madagascar.

(1384) *Cyclostomus ? vittatus*.

Shell depressed, nearly discoidal, rather solid, marked with crowded oblique striae and with very numerous spiral lines, which are more indistinct on the middle of the last whorl, opaque, whitish, sometimes irregularly striped with yellow, painted with 8-14 unequal chestnut coloured bands; spire somewhat raised, rather mucronate; whorls 5, convex, the last one large, somewhat depressed; umbilicus very broad and open; apertures lightly oblique, ovate, fulvid within with brown bands; peristome whitish, shortly reflexed with the margins, almost contiguous, joined by a white, slightly indented callus, right margin sinuate above. Height 19, greatest breadth 38, least br. 31 mill.

*Cyclostoma vittatum*, *Sow. Spec. Conch.* f. 91 94; *Reeve, Conch. Syst.* t. 185, f. 122; *Sow. Thes.* n. 62. p. 112. t. 25. f. 89. 90; *Pfr. Ic.* n. 82. p. 87. t. 11. f. 5. 6.

*Cyclophorus ? vittatus*, *Pfr. in Z. f. M.* 1847 p. 108. n. 26; *Gray, Cat. Cycl.* p. 21. n. 28; *Pfr. Consp.* n. 124.

*Cyclostomus ? vittatus*, *Pfr. Pneum. Mon.* p. 207.

*Hab.* Madagascar.

(1385) *Cyclostomus ? Moulinsii*.

Shell orbiculate, rather solid crowdedly and slightly spirally grooved, fulvous whitish, painted with numerous, sometimes confluent brown lines and one broader peripheral band, paler beneath; spire very short, mucronate; whorls 5, convex, enlarging rapidly, the last one impressed along the suture; umbilicus broad, open; aperture oblique, nearly circular, banded within with white and chestnut colour; peristome shortly expanded all round, with the margins nearly contiguous, joined by a lunarly indented callus, right margin sinuate above. Height 16, greatest breadth 35, least br. 26 mill.

*Cyclostoma Moulinsii*, *Grateloup, in. Act. Soc. Linn. Bord.* xi, p. 444. t. 3. f. 19. *Pfr. Ic.* n. 6, p. 15, t. 2, f. 18, 19.

*Cyclostoma Desmoulinsii*, *Sow. Thes.* n. 97, p. 125. t. 25. f. 97.

*Cyclophorus ? Moulinsii ?* *Pfr. in Z. f. M.* 1847 p. 108, n. 29; *Gray, Cat. Cycl.* p. 21. n. 27; *Pfr. Consp.* n. 125.

*Cyclostomus ? Moulinsii* *Pfr. Pneum. Mon.* p. 208.

*Hab.* Madagascar

(1386) *Cyclostomus euchilus*.

Shell turbinate globular, rather solid, crowdedly and obliquely striate, indistinctly decussated by more distant impressed lines, somewhat shining whitish, marbled with violaceous brownish and

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fulvous; spire turbinate raised, with the apex rather pointed; whorls 5½, convex, enlarging rapidly, last rounded, slightly depressed along the suture, with a single white peripheral band, crowdedly and deeply spirally furrowed beneath; umbilicus middle sized, funnel-shaped; aperture scarcely oblique, rather angularly rounded, shining and purplish flesh-coloured within; peristome nearly continuous, white, with the margins dilated above and joined by a slightly emarginated callus, right and basal margins very broad, vaulted and reflexed, left margin narrow, scarcely reflexed. Height 28, greatest breadth 43, least br. 32 mill.

*Cyclostoma euchilum*, *Pfr. in Proc. Z. S.* 1851. *Ic.* n. 288, t. 39. f. 3, 4.

*Cyclostoma euchilus*, *Pfr. Consp.* n. 303, p. 72. *Pneum. Mon.* p. 208.

*Hab.* Madagascar.

(1387) *Cyclostomus multifasciatus*.

Shell turbinate-conical, with numerous bands, subumbilicate, transversely striate; umbilicus covered; spire rather raised, very pointed; whorls 7, rounded, last ventricose; aperture wide, roundish, banded within; lip reflexed externally, with the edge white; columellar callus, saffron-coloured. Height 30-35, breadth 30-35 mill.

*Cyclostoma multifasciata*, *Grateloup, in Act. Bord.* xi p. 436, t. 3, f. 3.

*Tropidophora multifasciatum*, *Gray, Cat. Cycl.* p. 41, n. 16.

*Cyclostomus multifasciatus*, *Pfr. Consp.* n. 304; *Pneum. Mon.* p. 209.

*Hab.* Madagascar (Duisabo).

(1388) *Cyclostomus zonatus*.

Shell subumbilicate, globose-pyramidal, rather thin, nearly smooth, slightly decussated under a lens by longitudinal and spiral striæ, whitish-gray; spire conical, rather pointed; suture rather deep; whorls 6, rounded, last ventricose, girdled with a broad blackish band below the middle, spirally grooved round the umbilicus; aperture rather perpendicular, ovate-roundish; peristome interrupted, milk white, broadly reflexed. Height and breadth 28 mill.

*Cyclostoma zonatum*, *Petit, in Journ. Conch.* 1850, i. p. 50, t. 4. f. 7. *Cyclostomus zonatus*, *Pfr. Consp.* n. 305; *Pneum. Mon.* p. 209.

Smaller, with one or more bands; right margin of the peristome broadly expanded; columellar margin narrow, reflexed above into a short lamina, which almost covers the umbilicus. Height 20, greatest breadth 20, least br. 15 mill. (*Pfr. Ic.* n. 291, t. 39, f. 22, 23.)

*Hab.* Madagascar.

(1389) *Cyclostomus obsoletus*.

Shell turbinate, rather solid, faintly spirally striate above, slightly shining, ash-gray, painted with various blueish-fuscous bands; spire conical, rather pointed; whorls 6, convex, the last one deeply grooved spirally round the funnel-

shaped umbilicus; aperture scarcely oblique, ovate, grayish-chestnut-coloured within; peristome simple, white, broadly expanded, with the margins joined by a lunarly-indented callus. Height 22, greatest breadth 29, least br. 23 mill.

*Cyclostoma obsoleta*, Lam. Hist. vi. p. 144, n. 7; Ed. Desh. vii. p. 355; Deless. Recueil, t. 29, f. 11; Chenu, Ill. Conch. t. 1, f. 11. *Cyclostoma obsoletum*, Reeve, Conch. Syst. t. 183, f. 4; Sow. Thes. n. 88, p. 121, t. 27, f. 124; Pfr. Ic. n. 23, p. 32, t. 5, f. 8, 9.

*Tropidophora obsoleta*, Gray, Cat. Cycl. p. 40, n. 6.

*Cyclostomus obsoletus*, Pfr. Consp. n. 306; Pneum. Mon. p. 210.

*Cyclostoma obsoleta* var., marmorata, Grat. in Act. Bord. xi. p. 443, t. 3, f. 17.

Hab. Madagascar.

(1390) *Cyclostomus xanthochilus*.

Shell globose-conical, solid, irregularly and faintly striate, somewhat shining, grayish-fulvous, indistinctly striped and banded with brown; spire turbinate, rather pointed; whorls 6, convex, last rounded, rather flattened beneath; umbilicus narrow, scarcely previous; aperture nearly perpendicular, rather circular, shining blackish within; peristome shortly interrupted shortly expanded all round, fuscous-orange-coloured, with the margins joined by a short slightly indented callus. Height 20, greatest breadth 27, least br. 21 mill.

*Cyclostoma xanthocheles*, Sow. Thes. Suppl. n. 179, p. 158\*, t. 31, A. f. 294, 295.

*Cyclostoma xanthchilum*, Pfr. Ic. n. 233, t. 13, f. 5, 6.

*Cyclostomus xanthochilus*, Pfr. Consp. n. 308; Pneum. Mon. p. 211.

Hab. Madagascar.

(1391) *Cyclostomus aplustre*.

Shell globose-turbinate, thin, slightly decussated with very crowded striæ of growth and spiral lines, not shining, white, marked above with five or six fuscous bands; spire turbinate, rather pointed; whorls  $5\frac{1}{2}$ , convex, increasing rapidly, last cylindrical, not descending, rather uniformly white beneath; umbilicus middle-sized, deep; aperture oblique, roundish, rather angulated, with the bands chestnut-coloured within; peristome simple, thin, interrupted, shortly expanded, with the columellar margin shortly dilated and reflected. Operculum? Height 22, greatest breadth 29, least br. 25 mill.

*Cyclostoma aplustre*, Sow. in Proc. Z. S. 1849, p. 15; Moll. t. 2, f. 4, 5; Pfr. Ic. n. 230, t. 33, f. 5, 7.

*Tropidophora aplustris*, Gray, Cat. Cycl. p. 40, n. 7.

*Cyclostomus aplustre*, Pfr. Consp. n. 310; Pneum. Mon. p. 212.

Hab. Madagascar.

(1392) *Cyclostomus asper*.

Shell subglobose, conical, solid, slightly decussated by the striæ of growth and crowded spiral furrows, fulvous; spire conoidal, slightly truncate; whorls 5, convex, the upper ones pale, the last girdled with one whitish band on the periphery and with a fuscous band below the other; aperture rather circular, brown within; peristome expanded, white, with the margins approximate, joined by a slightly-indented callus; columellar margin dilated, reflexed. Height 20, greatest breadth 23, last br. 22 mill.

*Cyclostoma asperum*, Poties & Mich. Gal. Douai, i. p. 233, t. 23, f. 15, 16; Pfr. Ic. n. 86, p. 90, t. 11, f. 3, 4.

*Cyclostoma Harveyanum*, Sow. Spec. Conch. f. 210\*; Reeve Conch. Syst. t. 184, f. 13; Sow. Thes. n. 106, p. 128, t. 30, f. 250.

*Tropidophora aspera*, Gray, Cat. Cycl. p. 40, n. 9.

*Cyclostomus asper*, Pfr. Consp. n. 311; Pneum. Mon. p. 213.

Hab. Madagascar.

(1393) *Cyclostomus? striatulus*.

Shell globose-turbinate, solid, marked above with oblique striæ, and rather crowded concentric raised lines, scarcely shining, yellowish-white, spire shortly turbinate, with the apex rather blunt; whorls 5, convex, the upper ones smooth, the last one inflated, obsoletely angular at its periphery; umbilicus middle-sized, deep; aperture somewhat oblique, roundish, rather angular; peristome continuous, shortly affixed, thickened, slightly expanded, angulated above. Height 15, greatest breadth  $25\frac{1}{2}$ , least br. 21 mill.

*Cyclostoma striatulum*, Pfr. in Proc. Zool. Soc. 1852; Ic. n. 403, t. 49, f. 1, 2.

*Cyclostomus? striatulus*, Pfr. Pneum. Mon. p. 214.

Locality unknown.

(1394) *Cyclostomus fulvescens*.

Shell globose-conical, rather thin, equally sculptured with crowded raised spiral lines fuscous-fulvous; spire conical, rather pointed; whorls  $5\frac{1}{2}$ , convex, the last one slightly angulated at the periphery; umbilicus narrow, pervious; aperture oblique, ovate, chestnut, coloured within; peristome simple, thin, pale, shortly expanded, with nearly contiguous margins. Height 16, greatest breadth 22, least br. 18 mill.

*Cyclostoma fulvescens*, Sow. in Proc. Z. S. 1843, p. 63; Thes. p. 23, n. 99, t. 25, f. 79, 80. Pfr. Ic. n. 30; p. 39, t. 5, f. 10, 11.

*Tropidophora? fulvescens*, Gray, Cat. Cycl. p. 41, n. 12.

*Cyclostomus fulvescens*, Pfr. Consp. n. 313; Pneum. Mon. p. 315.

Hab. Madagascar.



# MOLLUSCA.

## (1395) *Cyclostomus insularis*.

Shell perforate, globose-conical, rather solid, sculptured with crowded, blunt, spiral ridges, rather coarsely decussated with very close longitudinal lines, not shining, dirty white, with several pale violaceous bands; spire shortly turbinate, rather blunt; whorls 5, convex, very slightly crenulate along the suture, last sculptured with more raised ridges beneath; aperture scarcely oblique, rather angularly roundish; peristome thin, expanded, slightly reflexed, with the margins approximate, joined by a rather indented callus, upper margin sinuate, left margin narrower. Height  $13\frac{1}{2}$ , greatest breadth 17, least br.  $13\frac{1}{2}$  mill.

*Cyclostoma insulare*, *Pfr. in Proc. Z. S.* 1851; *Id.* n. 368, t. 45, f. 5, 6.

*Cyclostomus insularis*, *Pfr. Consp.* n. 314, p. 63; *Pneum. Mon.* p. 215.

*Hab.* Isle of France.

## (1396) *Cyclostomus reticulatus*.

Shell turbinate, rather thin, marked with indistinct raised spiral lines, diaphanous, chestnut-coloured, reticulated irregularly with opaque white stripes and speckles; spire turbinate, rather pointed; whorls 5, very convex, enlarging rapidly, last rounded obsoletely grooved spirally within the middle sized umbilicus; aperture little oblique, roundish, slightly angulated; peristome rather simple, chestnut-coloured, with the edge white shortly interrupted, with the margins joined by thin callus. Height 13, greatest breadth 16, least br. 13 mill.

*Cyclostoma reticulatum*, *A. Adams & Reeve Voy. Samarang Moll.* p. 57, t. 14, f. 8; *Pfr. Id.* n. 237, t. 34, f. 13—16.

*Cyclostomus reticulatus*, *Pfr. Consp.* n. 315; *Pneum. Mon.* p. 216.

Larger; with the spiral striæ very obsolete; peristome broader, expanded, slightly reflexed; umbilicus wider; height 15, greatest breadth 22, least br. 17 mill.

*Hab.* Madagascar.

## (1397) *Cyclostomus Goudotianus*.

Shell globose-conical, thin, smooth, very faintly spirally striate, diaphanous, yellowish-fulvous, with 1—3 chestnut-coloured bands; spire conoidal, rather blunt; whorls 5, convex, last ventricose, sharply spirally furrowed beneath and within the middle-sized umbilicus; aperture rather circular, of the same colour within; peristome thin, expanded, slightly interrupted, with the columellar margin somewhat reflexed. Height 14, greatest breadth 17, least br. 14 mill.

*Cyclostoma Goudotianum*, *Sow. Thes.* n. 110, p. 130, t. 29, f. 193; *Pfr. Id.* n. 106, p. 106, t. 13, f. 8—10.

*Cyclostoma ligatum*, var. *Krauss. Südafr. Moll.* p. 82.

*Cyclostomus Goudotianus*, *Gray. Cat. Cycl.*

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p. 43, n. 2; *Pfr. Consp.* n. 316; *Pneum. Mon.* p. 216.

*Hab.* Natal (Krauss); East India (Menke).

## (1398) *Cyclostomus virgatus*.

Shell scarcely subperforate, turreted conical, rather thin, smooth, yellowish or whitish, girdled with chestnut-coloured lines and with a single broader band below the periphery; spire turreted, with the apex rather blunt; whorls 6, convex, last cylindrical, not descending; aperture scarcely oblique, ovate-roundish, uniformly coloured within; peristome sharp, slightly expanded, interrupted, with the columellar margin somewhat dilated, reflexed. Length 19, breadth 11 mill.

*Cyclostoma virgatum*, *Sow. Thes.* n. 111, p. 130, t. 29, f. 192, *Pfr. Id.* n. 105, p. 106 t. 13, f. 1—4.

*Cyclostomus virgatus*, *Gray. Cat. Cycl.* p. 44, n. 7; *Pfr. Consp.* n. 317; *Pneum. Mon.* p. 217.

With the spire less elongated, orange-coloured, with one chestnut-coloured band below the periphery, one sutural and two basal lines. (*Pfr. Id.* t. 13, f. 5 7.)

*Cyclostoma consocium*, *Feruss. Mus.*

*Cyclostoma consocius*, *Gray. Cat. Cycl.* p. 43, n. 3.

*Hab.* Madagascar.

## (1399) *Cyclostomus cincinnus*.

Shell conical, thin, slightly sculptured with crowded spiral ridges, uniformly white or marked with a single fuscous line below the periphery; spire conical, with the apex rather blunt; whorls 5, convex, the last one nearly smooth in the middle, crowdedly grooved beneath round the narrow scarcely pervious umbilicus; aperture nearly perpendicular, rather circular; peristome simple, sharp, with the margins almost contiguous; columellar margin slightly reflexed. Length 11, breadth  $7\frac{1}{2}$  mill.

*Cyclostoma cincinnus*, *Sow. in Proc. Z. S.* 1843, p. 60; *Thes.* n. 32, p. 102, t. 24, f. 77, 78; *Pfr. Id.* n. 140, p. 134, t. 18, f. 1-3.

*Cyclostoma modestum*, *Feruss. MSS. in Mus. Brit.*

*Cyclostomus cincinnus*, *Gray. Cat. Cycl.* p. 44, n. 8; *Pfr. Consp.* n. 320; *Pneum. Mon.* p. 218.

*Hab.* Madagascar? (Gray.)

## (1400) *Cyclostomus ligatulus*.

Shell oblong-conoidal, thin, umbilicated, subturreted, transversely slightly striate, many-banded; spire pointed; whorls 5-6, convex; aperture obovate, lip sharp, scarcely reflexed. Height 14-15, breadth 10 mill.

*Cyclostoma ligatula*, *Grateloup, in Act. Bord.* xi, p. 445, t. 3, f. 20.

*Cyclostomus ? ligatulus*, *Pfr. Consp.* n. 321 *Pneum. Mon.* p. 219.

*Hab.* Madagascar. (Mr. Duisabo).

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This may perhaps be identical with the preceding species.

### (1401) *Cyclostomus Zanguebaricus*.

Shell globose-conical, rather thin, sculptured with somewhat distant blunt spiral lines, whitish or yellowish; spire turbinate, rather pointed; whorls 5, convex, last ventricose, girdled with several chestnut-coloured lines and a single broader band below the middle, spirally grooved beneath round the narrow umbilicus; aperture nearly perpendicular, roundish, slightly angulated; peristome simple, scarcely interrupted on the penult whorl, very shortly expanded. Height  $8\frac{1}{2}$ , greatest breadth 10, least br. 9 mill.

*Cyclostoma Zanguebaricum*, *Petit*, in *Journ. Conch.* 1850, i. p. 53, t. 3, f. 5; *Pfr. Ic.* n. 292 t. 39, f. 24, 25.

*Cyclostomus Zanguebaricus*, *Pfr. Consp.* 322; *Pneum. Mon.* p. 219.

*Hab.* Zanzibar (Guillain).

### (1402) *Cyclostomus? filocinctus*.

Shell turbinate-globose, smooth near the depressed suture, otherwise girdled with numerous raised lines, whitish, with a fuscus periostraca; spire raised, rather conic, with the apex nipple-shaped; whorls  $4\frac{1}{2}$ , rounded, last cylindrical; aperture circular, scarcely angular above, equalling two-fifths of the total height, slightly sinuate near the umbilicus, which is deep and open; peristome double, inner edge simple, sharp, outer edge shortly reflected. Height  $2\frac{1}{2}$ , greatest breadth 3, least br.  $2\frac{1}{2}$  mill.

*Cyclostoma filocinctum*, *Benson*, in *Ann. and Mag. N. H.* 1851, viii. p. 188. *Pfr. v. Ic.* n. 409, t. 49, 26-28

*Cyclostomus? filocinctus*, *Pfr. Consp.* n. 325; *Pneum. Mon.* p. 221.

*Hab.* The Neilgherries Mountains (Jerdon).

### (1403) *Cyclostomus undulatus*.

Shell perforated, globose-conic, solid, spirally grooved all over; the furrows being deeper near the suture and on the lower side, fulvous flesh-coloured, with a single chestnut-coloured band below the periphery; spire conic, rather pointed; whorls 5, convex, increasing rapidly, undulated on the upper edge near the suture, which is well marked; aperture oblique, nearly circular, brownish within and banded with white and chestnut-colour; peristome simple, straight, with the margins joined angularly; right margin somewhat sinuate; columellar margin slightly thickened and dilated. Height 12, greatest breadth 13, least br. 15 mill.

*Cyclostoma fimbriata*, *Lam. Hist.* vi. p. 148, n. 24; *Ed. Desh.* viii. p. 360, n. 23.

(Not *Schum.*, nor *Quoy*, nor *Deless.*)

*Cyclostoma undulatum*, *Sow. Thes.* 25, p. 99, t. 23, f. 29, 30; *Pfr. Ic.* n. 94, p. 97, t. 12, f. 24-26.

*Cyclostoma fimbriatum*, *Petit*, in *Journ. Conch.* 1850, i. p. 42.

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*Cyclostomus undulatus*, *Gray*, *Cat. Cycl.* p. 44, n. 6; *Pfr. Pneum. Mon.* p. 223.

*Cyclostomus fimbriatus*, *Pfr. Consp.* n. 328.

*Hab.* The island of Mauritius.

### (1404) *Cyclostomus? gratus*.

Shell perforate, oblong-conic, solid, minutely crossed by raised spiral and very crowded longitudinal striæ, somewhat shining, flesh-coloured; spire stair-like, conic, with the apex purplish, rather blunt; whorls 5, convex, the last one slightly flattened beneath, somewhat angular at its periphery and round the perforation; aperture oblique, nearly circular, angular above, fire red within; peristome simple, continuous, straight, with the left margin shortly expanded above, slightly reflected at its lower part. Operculum? Length 7, breadth 5 mill.

*Cyclostoma gratum*, *Petit*, in *Journ. Conch.* 1850, i. p. 53, t. 3, f. 10; *Pfr. Ic.* n. 236, t. 34, f. 11, 12.

*Cyclostoma tricolor*, *Pfr. in Z. f. M.* 1849, p. 123, (March, 1850).

*Cyclostomus? gratus*, *Pfr. Consp.* n. 339; *Pneum. Mon.* p. 231.

*Hab.* The island of Abd-el-Goury, near Socotora.

### (1405) *Lithidion sulcatum*.

Shell convex-depressed, solid, girdled with rather sharp raised spiral ridges, slightly shining, blueish-white; spire somewhat raised, with the apex blueish, mucronulate; whorls 5, moderately convex, last rounded, deflected anteriorly; umbilicus wide, smooth internally; aperture very oblique, rather circular, brown inside; peristome rather thickened, slightly expanded, with the margins approximate, right margin sinuate. Height 5, greatest breadth 10, least br. 9 mill.

*Cyclostoma lithidion*, *Sow. Thes.* n. 61, p. 111, t. 31, f. 262; *Pfr. Ic.* n. 160, p. 150, t. 20 f. 20-22

*Lithidion sulcatum*, *Gray*, *Cat. Cycl.* p. 35, n. 1; *Pfr. Consp.* n. 255; *Pneum. Mon.* p. 176.

*Hab.* Yemen, Arabia (Powis, Sowerby).

### (1406) *Lithidion desciscens*.

Shell widely umbilicate, depressed semiglobose, slightly and closely spirally furrowed above, whitish; spire convex; whorls  $4\frac{1}{2}$ , moderately convex, the last one cylindrical, suddenly deflexed anteriorly, smooth beneath; aperture nearly horizontal roundish, sublunate white inside; peristome thickened, with the margins distant joined by callus, basal margin reflexed, columellar margin suddenly ascending in a curve. Height  $5\frac{1}{2}$ , greatest breadth 10, least br.  $8\frac{1}{2}$  mill.

*Cyclostoma desciscens*, *Pfr. in Proc. Z. S.* 1851; *Ic.* n. 250, t. 35, f. 25, 26.

*Lithidion desciscens*, *Pfr. Consp.* n. 256, p. 60, *Pneum. Mon.* p. 177.

*Hab.* Socotora.

### (1407) *Lithidion Souleyetianum*.

Shell convex-conoidal, solid, sculptured above



with six raised spiral ridges and with crowded transverse striae, shining, brownish-flesh-coloured; spire conoidal, with the apex rather blunt; whorls 5, last cylindrical, deflexed anteriorly, smooth beneath; umbilicus wide, open; aperture very oblique, saffron-coloured inside, irregularly rounded; peristome white, slightly thickened, interrupted, with the margins distant, upper margin rather expanded, basal margin shortly reflexed. Height  $4\frac{1}{2}$ , greatest breadth 8, least br. 7 mill.

*Cyclostoma Souleyetianum*, *Petit, in Journ. Conch.* 1850, i. p. 52, t. 3, f. 6; *Pfr. Ic.* n. 249. t. 35, f. 23, 24.

*Cyclostoma paradoxum*, *Pfr. in Z. f. M.* 1849, p. 128.

*Lithidion Souleyetianum*, *Pfr. Consp.* n. 257; *Pneum. Mon.* p. 177.

*Hab.* The Island of Abd-el-Goury, near Socotora (Guillain).

(1408) *Lithidion niveum*.

Shell broadly umbilicate, rather depressed, solid, indistinctly spirally striate above, slightly shining, white; spire little raised, mucronate; suture deep; whorls  $4\frac{1}{2}$ , moderately convex, the last one keeled above the middle, convex and smooth beneath; aperture diagonal, rather circular, flesh-coloured inside; peristome rather simple, shortly interrupted, with the margins joined by thin callus, upper margins sinuate, slightly expanded. Height 5, greatest breadth 11, least br. 9 mill.

*Cyclostoma niveum*, *Petit, in Journ. Conch.* 1850, i. p. 52, t. 3, f. 7; *Pfr. Ic.* n. 249. t. 35, f. 20-22.

*Lithidion niveum*, *Pfr. Consp.* n. 259, *Pneum. Mon.* p. 178.

*Hab.* Madagascar.

*Sub-genera.* *Otopoma* (foliaceum). *rec.* 15 sp.  
*Otopoma.* *Gray.*

28\*. *O. blennus*, B.—Moulmein. Rare.

(1409) *Otopoma clausum*.

Shell orbiculate-convex, rather solid, slightly and crowdedly spirally furrowed above, smooth beneath, flesh-coloured-whitish; spire short, blunt; suture flat, chestnut-coloured in the upper whorls; whorls 4, scarcely convex, the last one descending anteriorly, rather flattened beneath; aperture oblique, roundish-ovate, rather angular above, yellowish inside; peristome simple, straight, with distant margins, right margin sinuate, columellar margin dilated into a glassy, broad, reflexed lamina, which is affixed on all sides, and covers perfectly the umbilicus. Height 8, greatest breadth  $14\frac{1}{2}$ , least br.  $11\frac{2}{3}$  mill.

*Cyclostoma clausum*, *Sow. Thes.* n. 104, p. 128, t. 31, f. 266, 267; *Pfr. Ic.* n. 157, p. 147, t. 20, f. 13-15.

*Otopoma clausum*, *Gray. Cat. Cycl.* p. p. 36, n. 2; *Pfr. Consp.* n. 260; *Pneum. Mon.* p. 179.

Smaller, spire more raised, periphery marked with a single reddish-brown line; height  $7\frac{1}{2}$ ,

greatest breadth  $12\frac{1}{2}$ , least br. 10 mill. (*Pfr. Ic.* t. 42, f. 13-15).

*Hab.* Yemen, Arabia (Powis).

(1410) *Otopoma albicans*.

Shell depressed-globose, smooth, indistinctly marked with spiral and oblique striae, rather shining, white; spire broadly conoidal, blunt; whorls 5, convex, the upper ones distinctly furrowed concentrically, the last one descending anteriorly, rather ventricose; aperture slightly oblique, ovate; peristome continuous, shortly affixed, thickened and expanded, right margin arcuately dilated; columellar margin angularly produced near the umbilicus, which is wide and somewhat funnel-shaped. Height 23, greatest breadth 35, least br. 29 mill.

*Cyclostoma albicans*, *Sow. Spec. Conch.* ii. *Cycl.* f. 104, 105; *Sow. in Zool. of Beech. Voy.* p. 146, t. 38, f. 30, *Sow. Thes.* n. 79, p. 118, t. 26, f. 110-112; *Pfr. Ic.* n. 83, p. 87, t. 11, f. 3, 14.

*Otopoma albicans*, *Gray. Cat. Cycl.* p. 36, n. 5; *Pfr. Consp.* n. 262; *Pneum. Mon.* p. 181.

*Hab.* The Island of Hainan, South China (Benson).

(1411) *Otopoma naticoides*.

Shell conoidally-globose, solid thick rose-coloured-whitish; spire conoidal, rather blunt; whorls  $5\frac{1}{2}$ , convex, the upper ones minutely decussated, the last one closely wrinkled longitudinally, crossed by obsolete spiral folds; aperture little oblique, ovate, yelk-coloured inside; peristome thickened, slightly reflected, with the margins angularly joined by a thick, whitish deposit; columellar margin dilated into a rather thick, vaulted lamina, which in full-grown shells nearly covers the umbilicus. Height 35, greatest breadth 41, least br. 34 mill.

*Turbo foliaceus*, *Chemn. Conch. Cab.* x. p. ii, p. 59, t. 123, f. 1069, 1070? *Gmel. Syst.* p. 3602, n. 104?

*Cyclostoma foliaceum*, *Pfr. Ic.* n. 27, p. 36, t. 4, f. 10, 11?

*Cyclostoma naticoides*, *Recluz in Rev. Zool.* 1843, p. 3; *Mag. Zool.* 1843, t. 73, *Pfr. Ic.* n. 28, p. 37, t. 6, f. 14.

*Hab.* Socotora.

(1412) *Otopoma unifasciatum*.

Shell subglobose, with an acuminate but decollated spire, consisting of four rounded, smooth volutions, with faint spiral striae; volutions whitish, the last with a single fuscous band near the base; suture distinct; aperture circular, orange-coloured within; peristome white, reflected, sinuated above, thickened on the side of the umbilicus, which is small and spirally grooved, Height 20, breadth 22 mill.

*Cyclostoma unifasciatum*, *Sow. in Cat. Tank. App.* p. viii. n. 1016; *Thes.* n. 81, p. 119, t. 26, f. 105, 106; *Pfr. Ic.* n. 188, p. 173, t. 25, f. 4, 5 (from *Sow.*).

*Otopoma unifasciatum*, *Pfr. Consp.* n. 265; *Pneum. Mon.* p. 183.

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*Hab.* Madagascar (Sowerby).  
Compare *Otopoma Listeri*.

## (1413) *Otopoma? Philippianum*.

Shell globose-turbinate, thin, faintly striate, decussated above by minute spiral lines, fulvous-whitish, painted, on the upper side, with 3—4 narrow reddish-brown bands; spire turbinate, with the apex blackish; whorls 5—5½, rounded, the last one girdled, below the middle, with a single broader band smooth and uniformly white beneath; aperture little oblique, rather angularly roundish, of the same colour within; peristome slightly interrupted, with the margins joined by thin callus, right margin straight, columellar margin dilated, freely reflected, half concealing the narrow pervious umbilicus. Operculum? Height 22, greatest breadth 26, least br. 21 mill.

*Turbo ligatus* var., *Chemn. Conch.* ix. P. ii. p. 60, t. 123, f. 1073; 1074, (ed. alt. t. 4, f. 14. 15.)

*Cyclostoma ligatum*, *Sow. Thes.* n. 21, p. 98, t. 23, f. 24. (Not Muller.)

*Cyclostoma Philippianum*, *Pfr. Ic.* n. 356, t. 44, f. 23, 24.

*Otopoma Philippianum*, *Pfr. Consp.* n. 266, p. 61; *Pneum. Mon.* p. 183.

Locality unknown.

## (1414) *Otopoma? clathratulum*.

Shell conoidally-globose, rather thick, regularly trellised above by crowded longitudinal and spiral raised lines, brownish-flesh-coloured, marked often with small brown spiral lines above; spire conoidal, rather blunt; whorls 5, convex, the upper ones blackish-bordered above the suture, the last one smooth below the middle; umbilicus narrow, pervious; aperture obliquely ovate, angulated above, yelk-coloured within; peristome straight, rather thickened, with the margins nearly contiguous, angularly joined by a continued callus; columellar margin scarcely reflexed. Height 13, greatest breadth 22, least br. 18 mill.

*Cyclostoma clathratula*, *Riccluz. in Rev. Zool.* 1843, t. 74.

*Cyclostoma Clathratulum*, *Sow. in Proc. Z. S.* 1843, p. 30; *Thes.* n. 17, p. 97, t. 23, f. 15, 16; *Pfr. Ic.* n. 29, p. 38, t. 5, f. 5-7.

*Otopoma foliaceum* jun., *Gray. Cat. Cycl.* p. 35.

*Otopoma clathratulum* *Pfr. Consp.* n. 267; *Pneum. Mon.* p. 184.

*Hab.* Yemen, Arabia (Sowerby), Socotora (*Riccluz*).

## (1415) *Otopoma? vitellinum*.

Shell globose-conical, solid, coarsely decussated by crowded striæ of growth and more crowded spiral ridges, yellowish-reddish, with irregular paler stripes; spire raised, conical, with the apex rather blunt, blackish; whorls 5, convex, the last rounded, smooth below the middle, spirally

# MOLLUSCA.

grooved in the narrow pervious umbilicus; aperture scarcely oblique, ovate-roundish; peristome simple, with the margins approximate, joined by callus; right margin straight, rather sinuate; left margin dilated and expanded in the middle. Height 17, greatest breadth 19, least br. 17 mill.

*Cyclostoma vitellinum*, *Pfr. in Proc. Z. S.* 1851; *Ic.* n. 353, t. 43, f. 35, 36.

*Otopoma? vitellinum*, *Pfr. Consp.* n. 268, p. 61; *Pneum. Mon.* p. 184.

*Hab.* Madagascar.

## (1416) *Otopoma Listeri*.

Shell globose-conical, thick, smooth, shining-flesh-coloured; spire conical, with the spire rather pointed, horn-coloured; whorls 5, convex, the last one angulated indistinctly, sometimes girdled with a single reddish-brown line below the middle, deeply spirally grooved beneath; aperture somewhat oblique, rather ovate, fulvous within; peristome simple, straight, with distant margins angularly joined by thin callus, columellar margin dilated and reflexed, sometimes altogether closing the very narrow umbilicus. Height 13, greatest breadth 15½, least br. 13½ mill.

*Lister, Hist.* t. 44, f. 42.

*Cyclostoma Listeri*, *Gray, in Ann. of Philos.* 1821; *Sow. in Proc. Z. S.* 1843, p. 31; *Thes.* n. 20, p. 98, t. 23, f. 22, 23; *Pfr. Ic.* n. 95, p. 98, t. 12, f. 30, 31.

*Cyclostoma fimbriata*, *Quoy. & Gaim. Voy. Astrol.* p. 188, t. 12, f. 31, 35; *Desh. Recueil*, t. 29, f. 12; *Pfr. Ic.* n. 198, n. 179, t. 30, f. 34, 35, (from Quoy); *Chenu, Ill.* t. 1, f. 12.

*Cyclostoma Philippi*, *Grateloup, Act. Soc. Bord.* xi. p. 446, t. 3, f. 21?

*Otopoma Listeri*, *Gray, Cat. Cycl.* p. 36, n. 3; *Pfr. Consp.* n. 269; *Pneum. Mon.* p. 185.

*Hab.* The island of Mauritius.

## (1417) *Otopoma? spurcum*.

Shell orbiculate-turbinate, obconical, dirty white, widely umbilicate, striate longitudinally; spire short, pointed; whorls convex; aperture open, rounded; labrum simple, sharp. Height 15, breadth 20 mill.

*Cyclostoma spurca*, *Grateloup, Act. Soc. Linn. Bord.* xi. p. 444, t. 3, f. 12.

*Optoma spurcum*, *Gray, Cat. Cycl.* p. 37, n. 9; *Pfr. Consp.* 272; *Pneum. Mon.* p. 187.

*Hab.* Bombay?

## (1418) *Otopoma multilineatum*.

Shell globose-conoidal, solid, wrinkled and striate longitudinally, shining, fulvous; spire conical, with the apex rather blunt; whorls 4½-5, convex, the last ventricose, marbled with white and fulvous, girdled with chestnut-coloured lines; aperture somewhat oblique, roundish, rather angular, of the same colour within; peristome slightly expanded, thickened, with the margins distant, right margin angularly sinuous, deeply indented, columellar margin vaulted and reflected, almost closing the perforated axis. Height 14, greatest breadth 17, least br. 13½ mill.



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*Cyclostoma multilineata*, *Jay. Catal.* 1839, p. 123, t. 7, f. 12, 13.

*Cyclostoma flexilabrum*, *Sow. Thes.* n. 112, p. 130, t. 31, f. 258, 259; *Pfr. Ic.* n. 87, p. 91, t. 11, f. 7, 8; *Jay. Catal.* 1850, p. 256, n. 5869.

*Cyclostoma flavilabre*, *Petit, in Journ. Conch.* 1150, i. p. 42.

*Trophidophora flexilabrum*, *Gray, Cat. Cycl.* p. 41, n. 15.

*Otopoma multilineatum*, *Pfr. Consp.* n. 274; *Pneum. Mon.* p. 187.

*Hab.* Madagascar (Powis).

(1419) *Aulopoma Itieri*.

Shell depressed, nearly discoidal, solid, slightly striate, whitish, the whole surface being generally covered with a greenish-brown periostraca; spire mucronate, blueish-black; whorls 4-4½, cylindrical, the last one descending and disjoined anteriorly; umbilicus broad; aperture oblique, circular; peristome continuous, straight, sharp; Operc. typical, with five distantly striate whorls, Height 11, greatest breadth 22, least br. 18 mill.

*Cyclostoma Itierii*, *Guerin in Revue, Zool.* 1847, p. 1; *Petit in Journ. Conch.* i. p. 43;

*Cyclostoma cornu venatorium*, *Pfr. Ic.* n. 173, p. 159, t. 22, f. 1-3.

*Cyclostoma Hoffmeisteri*, *Benson in Ann. and Mag.* 2nd ser. vii. p. 265.

*Aulopoma Hoffmeisteri*, *Trosch. in Z. f. M.* 1847, p. 43; *Gray, Cat. Cycl.* p. 14, n. 4.

*Aulopoma cornu venatorium*, *Gray, Cat. Cycl.* p. 14, n. 1.

*Aulopoma Itierii*, *Gray, Cat. Cycl.* p. 14, n. 3; *Pfr. Consp.* n. 62. *Pneum. Mon.* p. 52.

*Hab.* Ceylon.

(1420) *Aulopoma helicinum*.

Shell subdiscoidal, rather thin, striate, pale horn-coloured, with reddish brown stripes, and one band of the same; spire mucronated, blueish-brown; whorls 4, cylindrical, the last one descending anteriorly and disjoined; aperture oblique, rather circular; peristome straight, thin, sharp. Operculum with the whorls more narrow, than of *A. Itierii*, convex, and crowdedly folded externally. Height 6½, greatest breadth 13, least br. 10 mill.

*Turbo helcinus*, *Chemn. Conch. Cab.* ix. p. ii. p. 59, t. 123, f. 1067, 1068.

*Turbo helecoides*, *Gmel. Syst.* p. 3602, n. 103.

*Cyclostoma helicinum*, *Pfr. Ic.* n. 26, p. 35, 160, t. 4, f. 5, 6, t. 22, f. 4, 5.

*Cyclostoma papua*? *Pfr. Nuit. Regist.* p. 85.

*Aulopoma helicinum*, *Pfr. in Z. f. M.* 1847, p. 111; *Consp.* n. 64; *Gray, Cat. Cycl.* n. 14, p. 2; *Pfr. Pneum. Mon.* p. 53.

*Hab.* Ceylon (Dr. Th. Philippi).

*Realia (hieroglyphica)*, *rec.* 17 sp.

(1421) *Realia Aurantiaca*.

Shell perforate, ovate conic, rather solid, minutely and crowdedly striated concentrically,

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red; spire conic, acute; whorls 6-7, scarcely convex, last striated longitudinally, slightly keeled on the periphery by a raised line, furnished with a second ridge near the perforation; aperture oblique, ovate, of the same colour within; peristome rather thickened, white; slightly expanded, with the margins disjoined; columellar margin simple, dilated above. Length 9½, breadth 5½ mill.

*Cyclostoma aurantiaca*, *Desh. in Belanger Voy. Zool.* p. 416, t. 1, f. 16, 17; *Desh. in Lam. Hist. viii.* p. 373, n. 43.

*Cyclostoma aurantiacum*, *Müll. Synops.* p. 38.

*Cyclostoma Belangeri* *Pfr. in Z. f. M.* 1846, p. 82; *Ic.* n. 201, p. 181, t. 30, f. 1-3.

*Hydrocena*? *Belangeri*, *Pfr. in Z. f. M.* 1847, p. 112, n. 3.

*Realia Belangeri*, *Gray, Cat. Cycl.* p. 63, n. 21.

*Omphalotropis aurantiaca*, *Pfr. in Proc. Z. S.* 1851; *Consp.* n. 457; *Pneum. Mon.* p. 309.

*Hab.* Pondicherry.

(1422) *Realia rubens*.

Shell perforate, ovate-conic, rather thin, very indistinctly striated concentrically opaque, marbled with brown and whitish; spire conic, acute; whorls 7, rather flat, the last one angulated below the middle by several raised lines, more distinctly keeled beneath; aperture scarcely oblique, ovate; peristome simple; slightly expanded, whitish, with the margins convergent. Length 8, breadth 4½ mill.

*Cyclostoma rubens*, *Quoy. and Gaim. Voy. Astrol.* ii. p. 189, t. 12, f. 36-39; *Desh. in Lam. Hist.* vii. p. 368, n. 34; *Pfr. Ic.* n. 202, p. 181, t. 30, f. 10-12.

*Cyclostoma Prangii*, *Pot. and Mich. Gal. Douai*, i. p. 240, t. 24, f. 18, 19.

*Hydrocena*? *rubens*, *Pfr. in Z. f. M.* 1847, p. 112, n. 5. *Realia rubens*, *Gray, Cat. Cycl.* p. 64, n. 5.

*Omphalotropis rubens*, *Pfr. in Proc. Z. S.* 1851, *Consp.* n. 458; *Pneum. Mon.* p. 309.

*Hab.* Isle of France.

(1423) *Realia dubia*.

Shell perforate, ovate conic, nearly smooth, rather thin, reddish horn-coloured; spire conic, subacute; whorls 6, moderately convex, the last somewhat shorter than the spire, angulated near the perforation; aperture rather perpendicular, ovate slightly effuse beneath; peristome simple, sharp, with distant margins, right margin straight, columellar margin very shortly reflexed. Length 9, breadth 5 mill.

*Cyclostoma dubium*, *Pfr. in Z. f. M.* 1846, p. 86; *Ic.* n. 203, p. 182, t. 30, f. 4, 6.

*Hydrocena*? *dubia*, *Pfr. in Z. f. M.* 1847, p. 112, n. 6.

*Realia dubia*, *Gray, Cat. Cycl.* p. 63, n. 6.

*Omphalotropis dubia* *Pfr. in Proc. p. Z. S.* 1851, *Consp.* n. 460; *Pneum. Mon.* p. 310.

*Hab.* The Island Opara (H. Cuming).

(1424) *Realia multilirata*.

Shell perforate, ovate-conic, rather solid, sculptured with rather sharp and close set spiral ridges (one on the middle and another on the base being stronger) reddish-flesh-coloured; spire conic, rather pointed; whorls  $5\frac{1}{4}$ , the upper ones rather flat, last more convex; aperture slightly oblique, angularly ovate; peristome simple, straight, with the margins approximate, columellar margin emarginated above, dilated and somewhat reflexed at its lower part. Length  $8\frac{1}{4}$ , breadth 5 mill.

*Cyclostoma multiliratum*, *Pfr. in Proc. Z. S.* 1851.

*Omphalotropis multilirata*, *Pfr. Consp. n.* 461. p. 70; *Pneum. Mon.* p. 311.

*Hab.* Isle of France (Sir David Barclay).

(1425) *Realia globosa*.

Shell umbilicated, globose conic, thin, very faintly striated, diaphanous, not shining, cinnamon coloured, painted with opaque whitish spots, which are somewhat arranged into bands; spire conic, with the apex very pointed; whorls 6, the upper ones scarcely convex, last globose, with a subtle thread-like basal keel; aperture slightly oblique, ovate; peristome simple, with the margins almost contiguous, right margin curved strongly, columellar margin dilated and spreading in the middle. Length 8, breadth 5 mill.

*Cyclostoma globosum*, *Bens. MSS.* (fide Barclay); *Pfr. Ic. n.* 295, t. 39. f. 14-16.

*Omphalotropis globosa*, *Pfr. in Proc. Z. S.* 1851. *Consp. n.* 462. p. 71; *Pneum. Mon.* p. 311.

*Hab.* Trees in woods on the island of Mauritius (Sir D. Barclay).

(1426) *Realia expansilabris*.

Shell scarcely perforate, ovate-conic, thin, rather smooth, slightly shining, pale yellow, minutely marbled with horn-colour and girdled with one or two reddish-brown bands below the periphery; spire elevated conic, rather pointed; whorls 6, scarcely convex, last with a thread-like keel in the middle and at the base; aperture oblique, ovate; peristome equally and narrowly expanded all round, white with the margins rather distant. Length  $5\frac{1}{2}$ , breadth 3 mill.

*Cyclostoma expansilabre*, *Pfr. in Proc. Z. S.* 1851; *Ic. n.* 296, t. 39, f. 17-19.

*Omphalotropis expansilabris*, *Pfr. Consp. n.* 464, p. 71; *Pneum. Mon.* p. 312.

*Hab.* The island of Mauritius (Sir D. Barclay).

*Cyclophorus*, *rec.* 90 sp.

(1427) *Cyclophorus Himalayanus*.

Shell globose turbinated, rather solid, with 10-12 blunt spiral ribs and obsolete interposed lines, whitish, with a deciduous periostraca of ... colour; spire turbinated, reddish-brown and rather pointed above; whorls 5, moderately convex, the

last one ventricose, scarcely compressed around the umbilicus, which is narrow and funnel shaped; aperture nearly perpendicular, circular; peristome simple, continuous, shortly affixed, brownish fiery, rather thickened, shortly expanded, somewhat angulated above. Operc? Height 35, greatest breadth 48, least br. 39 mill.

*Cyclostoma Himalayanum*, *Pfr. in Proc. Z. S.* 1851, p.; *Ic. n.* 228, t. 33. f. 10, 11.

*Cyclophorus Himalayanus*, *Pfr. Consp. n.* 65, p. 50; *Pneum. Mon.* p. 55.

*Hab.* India, the Himalayan Mountains.

(1428) *Cyclophorus Simensis*.

Shell turbinated depressed, solid, smooth, chestnut-coloured, elegantly painted with angular whitish stripes; spire shortly turbinated, with the apex rather blunt; whorls 5, convex, rather flattened near the deep suture, the last one rounded at the periphery, obsolete compressed around the funnel-shaped umbilicus; aperture little oblique, large, circular, whitish inside; peristome rather thickened and reflected, yellowish flesh coloured shortly affixed to the penult whorl. Operc? Height 29, greatest breadth 51, least br. 40 mill.

*Coclostoma Siamense*, *Sow. Thes. Suppl. n.* 178, p. 158, t. 31 A. f. 292, 293; *Pfr. Ic. n.* 331, t. 42, f. 5, 6.

*Cyclophorus Siamensis*, *Pfr. Consp. n.* 67; *Pneum. Mon.* p. 56.

*Hab.* Siam.

(1429) *Cyclophorus tuba*.

Shell suborbicular, rather depressed, thin, smooth, whitish, varied and clouded with reddish brown; spire short, rather flattened, acuminate at the apex; volutions 5, flattish, the posterior carinated, the last very large and rounded; aperture very large, circular, expanded, whitish, peristome whitish, thin, broad, revolute, interrupted over the last volution; umbilicus large, Operculum reddish-horn-coloured. Height 25, breadth 45 mill. (Sow.)

*Cyclostoma tuba*, *Sow. in Proc. Z. S.* 1843. p. 83. *Thes. n.* 91, p. 122 t. 27. f. 129, 130; *Pfr. Ic. n.* 183. p. 189. t. 23, f. 10, 11; *Sonleyet. in Voy. Bonite Moll t.* 30, f. 25-27.

*Cyclophorus tuba*, *Pfr. in Z. f. M.* 1847; p. 107; *Consp. n.* 68; *Gray, Cat. Cycl. p.* 16, n. 3; *Pfr. Pneum. Mon.* p. 57.

A little smaller and more depressed, with the last whorl subcarinated at the periphery, and with the peristome not so broadly expanded scarcely reflected.

*Hab.* Malacca, Mount Ophir (H. Cuming.)

(1430) *Cyclophorus Pearsoni*.

Shell depressed-turbinated, smooth, with obsolete spiral striae, varied and broadly banded with chestnut-brown above, with brownish spiral lines beneath, with a white band at the periphery, and another of blackish-chestnut-colour immediately below it; spire depressed-conoidal with the apex



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pointed; whorls 5, moderately convex, the last one large, convex beneath; aperture scarcely oblique, large, circular blueish inside; peristome expanded, reflected on all sides, pale orange-coloured; the margin joined by a short callus; umbilicus rather narrow, open, more narrow interiorly. Height 25, greatest breadth 42, least br. 33 mill. (B.)

*Cyclostoma Pearsoni*, Benson, in *Ann. and Mag.* 28, ser. viii. 1851, p. 185; *Pfr. Ic.* n. 411, t. 49, f. 34-36.

*Cyclophorus Pearsoni*, *Pfr. Consp.* n. 70, *Pneum. Mon.* p. 58.

*Hab.* India, the Khasya Hills.

(1431) *Cyclophorus volvulus*.

Shell globose-conic, solid, smooth, fulvid, varied with chestnut-coloured stripes and spots; spire conoidal, with the apex blunt; whorls 5, rounded, the last one very obsolete angulated at the periphery, with a broad blackish-chestnut-coloured band below the periphery; umbilicus of middle size, funnel-shaped; aperture oblique, nearly perpendicular, blueish-whitish within; peristome whitish, double; internal edge continuous, thickened rather produced; external edge reflected emarginated near the penult whorl. Operculum, with a lamellar margin to the whorl. Height 23, greatest breadth 37, least br. 29 mill.

*Helix volvulus*, *Mill. Hist. Verm.* ii. p. 82, n. 280; *Born. Test.* p. 379, t. 14, f. 23, 24; *Gmel. Syst.* p. 3638, n. 91.

*Turbo lituus*, *Gmel. Syst.* p. 3589, n. 111.

*Lituus*, *Martin. Fig. of non-descr. Shells*, t. 27, *Ed. Ohenu. (Bible Conch. ii.)* p. 21, t. 8, f. 1.

*Cyclophorus volvulus*, *Montf. Conch.* ii. p. 291, t. 73. *Pfr. in Z. f. M.* 1847, n. 107; *Consp.* n. 71; *Gray. Cat. Cycl.* p. 16, n. 7; *Pfr. Pneum. Mon.* p. 58.

*Cyclostoma volvulus*, *Lam. in Encycl. Meth.* t. 461 f. 5. *Lam. Hist.* vi p. 143, n. 2, *Ed. Desh.* viii. p. 353 (part); *Desl. in Enc. Meth.* ii. p. 39, n. 2, (part) *Reeve. Conch. Syst.* ii. t. 185, f. 22. *Sow. Thes.* n. 89, p. 121, t. 21, f. 126, *Pfr. Ic.* n. 19, p. 27 t. 3, f. 1. 2. *Grat. in Act. Bord.* xi. p. 435, t. 8, f. 1.

*Cyclostoma trochiforme*, *Lamarck.°° Soul. in Voy. de la Bonite. Moll.* t. 20, f. 18-21.

*Cyclostoma laevigatum*, *Voghl. in Cuvier. Thierr.* iii, p. 178.

*Cyclostoma variata*, *Boys. MSS. in Mus. Brit.*

*Cyclophora volvula*, *Swains. Malac.* p. 336, *Lister, Hist.* t. 50, f. 48.

With the inner peristome elongated forward.

*Cyclostoma volvulus*, var. *Pfr. Ic.* t. 45, f. 1, 2.

Smaller; height 16, greatest breadth 27, least br. 22 mill.

*Hab.* India. Pulo Condore.

(1432) *Cyclophorus involvulus*.

Shell turbinate-depressed, solid, furnished above with rather crowded, obtusely-raised, spiral ribs,

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pale fulvous, marbled with chestnut-coloured stripes and spots; spire short, rather acuminate; whorls 5, convex, the last one broad with a pale peripheral band, and another broad blackish band, which is sprinkled with white below the periphery, convex, and whitish beneath; umbilicus middle-sized, open; aperture slightly oblique, rather circular, obsolete angulated, above, orange-coloured inside; peristome double; inner, edge continuous, straight, rather thickened, fiery-red; external edge paler, reflected. Operc. typical. Height 20, greatest breadth 34, least br. 28 mill.

*Helix involvulus*, *Mull. Hist. Verm.* ii. p. 84, n. 281; *Gmel. Syst.* p. 3638, n. 92; *Dillw. Descr. Catal.* ii. p. 890.

*Helix volvulus*, *Wood. Ind.* t. 32, f. 7.

*Turbo volvulus*, *Chemn. Conch. Cat.* ix. p. ii. p. 57, (part). t. 123, f. 1066.

*Cyclostoma volvulus*, *Lam. Hist. and Desh.* (part). *Voight. in Cuv.*

*Thierr.* iii p. 178.

*Hab.* India; Common from Sicrigully, Bahar, Batharghata.

(1433) *Cyclophorus Ibyatensis*.

Shell turbinate-depressed, solid, smooth, slightly striate, shining, chestnut-coloured, marked with white spots and bands; spire turbinate, with the apex rather pointed, horn-coloured; whorls 5, moderately convex, the last one somewhat depressed near the suture, painted with large square or triangular white spots, very obsolete angulated at the periphery, white around the middle-sized funnel-shaped umbilicus; aperture little oblique, nearly circular; peristome somewhat thickened, expanded, with the margins approaching each other, joined by a continuous callus. Operc? Height 14, greatest breadth 32, least br. 18 mill.

*Cyclostoma Ibyatense*, *Pfr. in Proc. Z. S.* 1851; *Ic.* n. 366, t. 45, f. 19, 20.

*Cyclophorus Ibyatensis*, *Pfr. Consp.* n. 74, p. 51; *Pneum. Mon.* p. 61.

*Hab.* The Island of Ibyat, Bashee group.

(1434) *Cyclophorus aurantiacus*.

Shell depressed-turbinate, solid, blackish-chestnut-coloured, marbled with fulvous and whitish, closely striate and obsolete decussated with crowded spiral lines; spire short, with the apex rather pointed; whorls  $5\frac{1}{2}$ , convex, the last one very large, somewhat depressed, more or less distinctly keeled at its periphery, pale beneath, with chestnut spiral lines; umbilicus broad, funnel-shaped; aperture rather oblique, large nearly circular, blueish inside; peristome continuous, shortly affixed to the penult whorl, thickened and expanded, flesh-coloured. Operculum with the margin of the whorls lamellar. Height 32, greatest breadth 58, least br. 46 mill.

*Turbo volvulus* var., *Chemn. Conch. Cat.* ix. t. 123, f. 1064, 1065.

*Helix volvulus*, *Mull. Hist. Verm.* ii. p. 83.

*Annularia aurantiaca*, Schumacher, *Essai*, p. 196.

*Cyclostoma pernobilie*, Gould, in *Proc. Bost. Soc.* i. 1843, p. 140; *Bost. Journ.* 1844, p. 458, t. 24, f. 11.

*Cyclostoma pernobilie*, Pfr. *Ik.* n. 21, p. 30, t. 3, f. 15 (from Gould).

*Cyclostoma aurantiacum*, Pfr. *Ik.* n. 22, p. 31, 167, t. 4, f. 8, 9, t. 23, f. 4, 5.

*Cyclophorus aurantiacus*, Pfr. in *Z. f. M.* 1847, p. 107, n. 1; *Consp.* n. 78; Gray, *Cat. Cycl.* p. 15, n. 1; Pfr. *Pneum. Mon.* p. 62.

*Hab.* India, Tavoy and Mergui, British Burmah.

(1435) *Cyclophorus Bensoni*.

Shell globose-turbinate, solid, minutely decussated with oblique and crowded spiral lines, whitish-fulvous, marbled with chestnut; spire turbinate, rather blunt; whorls 5, convex, the upper ones uniformly dirty brownish, the following ones painted with flames, the last one large, obsoletely keeled, bearing on the keel a blackish band, and on both sides unequal chestnut-coloured bands, pale and rather compressed round the umbilicus, which is narrow and funnel-shaped; aperture rather oblique, nearly circular, milk-white inside; peristome continuous, fiery orange red, shortly affixed, shortly and convexly reflected. Operc. ? Height 26, greatest breadth 43, least br. 34 mill.

*Cyclostoma Bensoni*, Pfr. in *Proc. Z. S.* 1851, *Ik.* n. 225, t. 32, f. 11-13.

*Cyclophorus Bensoni*, Pfr. *Consp.* n. 79, p. 52; *Pneum. Mon.* p. 63.

Locality unknown.

(1436) *Cyclophorus Borneensis*.

Shell depressed-turbinate, rather thin, striate sculptured with very fine and crowded spiral lines, fulvous above, with chestnut-coloured stripes and spots; spire conoidal, with the apex rather pointed; suture flat, bordered; whorls 5, scarcely convex, the last one sharply keeled, marked with a broad chestnut-coloured band, which is spotted with white below the keel, rather compressed round the middle-sized umbilicus; aperture oblique, rather truncated-oval; peristome shortly expanded, not thickened, with the margins somewhat distant, united by a thin deposit. Operculum reddish, concave externally. Height 20, greatest breadth 40, least br. 33 mill.

*Cyclostoma Borneense*, Metcalfe, in *Proc. Z. S.* 1851; Pfr. *Ik.* n. 384, t. 47, f. 1-3.

*Cyclophorus Borneensis*, Pfr. *Consp.* n. 80. *Pneum. Mon.* p. 63.

*Hab.* Borneo.

(1437) *Cyclophorus perdix*.

Shell depressed-turbinate, rather thin, obsoletely girdled with raised lines, deeply chestnut-coloured, conspersed with white points and marked, near the suture, with a band, which is articulated with brown, and whitish; spire short,

pointed; whorls 5, somewhat flattened, the last one large, keeled, convex beneath; umbilicus middle-sized, open; aperture scarcely oblique, large, nearly circular, blueish-white; peristome broadly expanded and reflected, with the margins almost united. Operculum horny-reddish. Height 19, greatest breadth 39, least br. 27 mill.

*Cyclostoma perdix*, Brod. and Sow. in *Zoolog. Journ.* v. p. 50; Sow. *Thes.* n. 90, p. 122, t. 27, f. 127; Pfr. *Ik.* n. 55, p. 60, t. 8, f. 7-9; *Monsf. Jav. Moll.* p. 54, t. 8, f. 1.

*Cyclostoma variegatum*, Val. *MSS.*; Philippi, *Abbild.* i. 5, p. 104, t. 1, f. 3.

*Cyclophorus perdix*, Pfr. in *Z. f. M.* 1847, p. 107, n. 4; *Consp.* n. 81; Gray, *Cat. Cycl.* p. 16, n. 4; Pfr. *Pneum. Mon.* p. 63.

*Hab.* India, Tenasserim, and Java?

(1438) *Cyclophorus Zollingeri*.

Shell umbilicate, orbiculate-conic, transversely substriate, brownish, with white points and spots; spire prominent, with the nucleus transversely strongly striate; suture linear; whorls  $4\frac{1}{2}$ -5, rather flat, marked above with small oblique ribs, which are crossed rectangularly by the striae of growth; last whorl furnished with an obtuse keel, which is articulated with white and brownish, rather flattened beneath, with the back band obtuse; aperture broadly orbicular, violaceous, with the margin rather thickened, expanded. Operc. obscurely spiral, smooth inside, with the centre prominent, Height 17-21, greatest breadth 23-31, least br. 21-25 mill. (M.)

*Cyclophorusma Zollingeri*, *Monsf. Jav. Moll.* p. 55, t. 7, f. 2.

*Cyclostoma Zollingeri*, Pfr. *Consp.* n. 82; *Pneum. Mon.* p. 64.

*Hab.* Java.

(1439) *Cyclophorus porphyriticus*.

Shell depressed conoidal thin, sculptured with very crowded, distinct, raised, somewhat undulate spiral lines, whitish, marked above with dark chestnut, more pale beneath, sprinkled with angular spots, which are larger along the suture, and with two dark bands, which are articulated with white, the one of which at the periphery, the other below; spire short with the apex pointed; suture scarcely distinct; whorls  $4\frac{1}{2}$ , rather flattened, the last one angulate, nearly flat beneath; umbilicus middle-sized; aperture large ovate circular, grayish-white; peristome thin, expanded, and reflected, with the margins convergent, united by a thin deposit, columellar margin narrower, slightly emarginate. Operc. ? Height 18, greatest breadth 31, least br.  $24\frac{1}{2}$  mill (B.)

*Cyclostoma porphyriticum*, Benson in *Ann. and Mag.* 2nd ser. viii. 1851, p. 187; Pfr. *Ik.* n. 415, t. 50, f. 22-24.

*Cyclophorus porphyriticus*, Pfr. *Consp.* n. 83; *Pneum. Mon.* p. 65.



*Hab.* East India.

(1440) *Cyclophorus expansus*.

Shell turbate, rather globular, solid, with crowded spiral striæ, opaque, marbled above with chestnut and whitish; spire conoidal, with the apex rather pointed; whorls 5, moderately convex, the last one more convex, dilated, slightly keeled at its periphery; painted beneath with narrow chestnut-coloured bands; umbilicus narrow, open; aperture nearly perpendicular, rather circular; peristome rather simple, continuous, shortly affixed, pale orange-coloured, flatly expanded all round into the plane of the aperture, with the edge slightly reflected. Operc.? Height 19, greatest breadth 30, least br. 22 mill.

*Cyclostoma expansum*, *Pfr. in Proc. Z. S.* 1851;  *Ic. n.* 290, t. 39, f. 20, 21.

*Cyclophorus expansus*, *Pfr. Consp. n.* 84, p. 52; *Pneum. Mon.* p. 65.

*Hab.* Tavoy, Burmah.

(1441) *Cyclophorus Cantori*.

Shell subglobose-conoidal, with very numerous, slight, spiral, striæ, fulvid, with a grayish-white periostraca, which is marbled, spotted, and lineated with reddish-brown and girdled usually with one peripheral blackish band; spire conoidal, pointed; whorls 5, moderately convex, the upper ones obliquely striate, the last whorl obsoletely angulate; umbilicus rather narrow, open; aperture nearly perpendicular, large, circular, with the margins united by a thin deposit; peristome expanded, rather flattened and reflected. Operc. typical. Height  $14\frac{1}{2}$ -19, greatest breadth 24-30, least br. 19-23 mill. (*B.*)

*Cyclostoma Cantori*, *Benson, in Ann. and Mag.* 2nd. ser. viii. 1851, p. 186; *Pfr. Ic. n.* 414, t. 50 f. 4-6.

*Cyclophorus Cantori*, *Pfr. Consp. n.* 85; *Pneum. Mon.* p. 65.

*Hab.* The Island of Penang (Cantor).

(1442) *Cyclophorus Menkeanus*.

Shell turbate, solid, marbled with chestnut and white, with crowded spiral lines above, which are slightly decussated by the striæ of growth; spire short, conoidal, blunt; whorls 5, convex, the last one angulated at its periphery, with a peripheral white band, and another, which is broader and blackish-chestnut-coloured, immediately below it, more smooth beneath, white round the middle-sized umbilicus; aperture oblique, nearly circular, pale orange-coloured inside; peristome double; inner edge continuous, wrinkled, very much protracted at the upper and right side; external edge thickened, expanded, angulated above, interrupted near the penult whorl. Operc.? Height 20, greatest breadth 30, least br. 28 mill.

*Cyclostoma Menkeanum*, *Philippi, in Z. f. M.* 1847, p. 123; *Pfr. Ic. n.* 185, p. 171, t. 28, f. 6-8.

*Cyclophorus Menkeanus*, *Pfr. in Z. f. M.* 1847, p. 107; *Consp. n.* 86; *Gray. Cat. Cycl.* p. 18, n. 10; *Pfr. Pneum. Mon.* p. 66.

*Hab.* Ceylon, Point de Galle (Benson).

(1443) *Cyclophorus amœnus*.

Shell depressed-turbinate, solid, smooth, white, very elegantly painted with numerous chestnut-coloured fulvous lines, which are interrupted by arrow-shaped spots; spire conoidal, blunt; whorls  $4\frac{1}{2}$ , moderately convex, the last one inflated above, with a rather compressed keel at its periphery, below which is placed a darker band, convex beneath, white round the narrow funnel-shaped umbilicus; aperture little oblique, nearly circular; peristome double; inner edge continuous, straightly produced; outer edge thick, expanded, scarcely indented on the penult whorl. Operc.? Height 18, greatest breadth 30, least br. 24 mill.

*Cyclostoma amœnum*, *Pfr. in Proc. Z. S.* 1851;  *Ic. n.* 362, t. 45, f. 11, 12.

*Cyclophorus amœus*, *Pfr. Consp. n.* 87, p. 52; *Pneum. Mon.* p. 66.

Locality unknown.

(1444) *Cyclophorus turgidus*.

Shell turbate-globose, solid, striate, and minutely foveate, fulvous, with chestnut-coloured bands and interrupted lines, and usually with arrow-shaped spots along the suture; spire turbate, with the apex rather blunt; whorls 5, convex, the last one inflated above, surrounded below the middle, with a cord-like keel and with a broader blackish band, rather flattened beneath, somewhat compressed round the umbilicus, which is narrow, funnel-shaped; aperture oblique, rounded, scarcely angular; peristome double; inner edge continuous; outer edge thickened, expanded, shortly interrupted near the penult whorl. Operc. pale horn-coloured. Height 16-18, greatest breadth 22-27, least br.  $18\frac{1}{2}$ -23 mill.

*Cyclostoma crassum*, *Pfr. in Proc. Z. S.* 1851, *Jul. Not Adams*.

*Cyclostoma turgidum*, *Pfr. Ic. n.* 241, t. 35, f. 15, 16.

*Cyclophorus turgidus*, *Pfr. Consp. n.* 88, p. 53; *Pneum. Mon.* p. 67.

*Hab.* Liew Kiew and Ibyat, Bashee group.

(1445) *Cyclophorus punctatus*.

Shell depressed-turbinate, rather thin and smooth (with very minute oblique striæ), pale yellowish-horn-coloured, painted with chestnut-coloured points and arrow-shaped spots, which are arranged in single rows; spire short, with the apex rather pointed, blackish; whorls 5, convex, the upper ones often with waving streaks, the last one ventricose, rather angulate at its periphery and marked with a dark chestnut-coloured band, which is denticulated on both sides; umbilicus narrow, open; aperture rather oblique, nearly circular, whitish inside; peristome shortly

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expanded all round, with the margins united by a thin deposit. Operc? Height 18, greatest breadth 25, least br. 20 mill.

*Cyclostoma punctata*, Grateloup, *Act. Soc. Bord.* xi. p. 440, t. 3, f. 10.

*Cyclostoma punctatum* *Pfr. Ic.* n. 31, p. 40, t. 5, f. 12, 13.

*Cyclostoma irroratum*, Sow. in *Proc. Z. S.* 1843, p. 61; *Thes.* n. 94, p. 123, t. 27, f. 134, 135.

*Cyclophorus punctatus*, *Pfr. in Z. f. M.* 1847, p. 107, n. 11; *Consp.* n. 89; *Gray, Cat. Cycl.* p. 18, n. 11; *Pfr. Pneum. Mon.* p. 67.

*Hab.* Ceylon (Grateloup), China (Sowerby).

Shell marked all over with chestnut-coloured flames and stripes; height 16, greatest breadth 24, least br. 19 mill.

*Hab.* Philippine Island, Basilan (H. Cuming).

(1446) *Cyclophorus eximius*.

Shell turbate-depressed, solid, keeled, whitish, with brown angular stripes, covered with a chestnut-coloured fulvous periostraca; spire shortly turbate, with the apex rather pointed; whorls 5, moderately convex, furnished above with three obtuse spiral ribs, minutely decussated by spiral and oblique striæ; last whorl very large, blackish-chestnut-coloured and ventricose below the keel, which is rather sharp, somewhat compressed round the umbilicus, which is rather broad and funnel-shaped; aperture little oblique, nearly circular; peristome pale flesh-coloured yellowish, double; inner edge continuous, expanded, affixed to the outer edge, which is rather interrupted, expanded into the plane of the aperture, with the columellar margin dilated, somewhat reflected. Operc.? Height 32, greatest breadth 62, least br. 47 mill.

*Cyclostoma eximium*, Mousson, *Jav. Moll.* p. 53, t. 7, f. 1; *Pfr. Ic.* n. 227, t. 33, f. 1, 2.

*Cyclophorus eximius*, *Pfr. Consp.* n. 92; *Pneum. Mon.* p. 69.

*Hab.* India, Khasya Hills (Mus. Cuming); Java? (Mousson.)

(1447) *Cyclophorus Ceylanicus*.

Shell depressed-turbinate, solid, decussated by very numerous sharp raised ridges, between which are placed smaller ones, and very crowded longitudinal striæ, dark chestnut-coloured, painted with narrow waving white streaks, spiral conoidal, with the apex rather blunt; whorls 5, convex, increasing rapidly, the last one marked with a broad blackish band below the chief carina, which is situated nearly on the middle, and is sharper than the others, rather compressed, and straw-yellow round the funnel-shaped umbilicus; aperture rather oblique, nearly circular, blueish white inside; peristome thickened, white, with the margins united above by a thin deposit into a channelled angle, right margin expanded columellar margin reflected. Operc. thin, rather

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concave externally. Height 24, greatest breadth 37, least br. 30 mill.

*Cyclostoma Ceylanicum*, Sow. *MSS.*; *Pfr. Ic.* p. 171, n. 186, t. 29, f. 1-3.

*Cyclostoma Indicum*, Sow. *Thes. Suppl.* n. 190, p. 163, t. 31, B f. 320, 321.

*Cyclophorus Ceylanicus*. *Pfr. Consp.* n. 93; *Pneum. Mon.* p. 70.

*Hab.* Ceylon.

(1448) *Cyclophorus stenomphalus*.

Shell somewhat top-shaped, solid, sculptured above with numerous strong spiral ridges, between which are situated smaller ones, fulvous, with more or less distinct dark marble painting, and an articulated band along the suture; spire turbate, with the apex pointed; whorls  $5\frac{1}{2}$ , convex, the last one furnished with a stronger keel at the periphery, ventricose and spirally striate beneath; umbilicus very narrow, scarcely going through; aperture large, nearly circular; peristome double; inner edge pale orange-coloured; outer edge expanded, rather thickened, dilated and angulated above, with the columellar margin thickened, shortly reflected. Operc.? Height 24, greatest breadth 35, least br. 23 mill.

*Cyclostoma stenomphalus*, *Pfr. in Z. f. M.* 1846, p. 44; *Ic.* n. 54, p. 59, t. 8, f. 5, 6.

*Cyclophorus stenomphalus*, *Pfr. in Z. f. M.* 1847, p. 107, n. 8; *Consp.* n. 94; *Gray, Cat. Cycl.* p. 17, n. 9; *Pfr. Pneum. Mon.* p. 70.

Variety; *Cyclostoma Aurora*, Benson, in *Ann. & Mag.* 2nd ser. viii p. 186 (*Pfr. Ic.* t. 50, f. 11-13.)

*Hab.* India; Khasya Hills.

(1449) *Cyclophorus Jerdoni*.

Shell depressed turbate, decussated above by very crowded, raised and wrinkled lines and oblique striæ, more slightly decussated beneath; colour whitish, painted with angular chestnut coloured flames above, and till the middle of the lower surface, surrounded by a pale peripheral band, which is articulated with alternate stripes; spire depressed, with the apex prominent; whorls 5, convex, the last one depressed and flattened near the suture, which is distinct; rather angulated at its periphery; umbilicus middle sized, deep, open, showing two whorls; aperture scarcely oblique, nearly circular, angulate above; peristome rather expanded, thickened, whitish, with the margins united by a thick deposit, columellar margin rather reflected. Operc.? Height 20, greatest breadth 35, least br. 28 mill. (B.)

*Cyclostoma Jerdoni*, Benson, in *Ann. & Mag.* 2nd ser. viii 1851, p. 185; *Pfr. Ic.* n. 413, t. 50, f. 1-3.

*Cyclophorus Jerdoni*, *Pfr. Consp.* n. 95; *Pneum. Mon.* p. 71.

*Hab.* India. The Neilgherries Mountains (Jerdon).

(1450) *Cyclophorus zebrinus*.

Shell depressed-turbinate, rather solid, keeled,



sculptured with oblique, somewhat scaly striæ, and with several raised spiral ribs on the upper side, fulvous, irregularly painted with broad chestnut-coloured spots and waving whitish stripes; spire turbinate, blunt; whorls 5, moderately convex, the last one broad, convex beneath, rather compressed round the umbilicus, which is narrow and funnel-shaped; aperture rather oblique, circular, blueish inside; peristome white, double; inner edge continuous, expanded; outer edge thickened, reflected, affixed. Operc. ? Height 21, greatest breadth 34, least br. 27 mill.

*Cyclostoma zebrinum*, Benson, in *Journ. As. Soc.* v. 1836, p. 355; *Sow. Thes. Suppl.* p. 157, n. 176, t. 31, *A. f.* 237, 288; *Pfr. Ic.* n. 240, t. 34, f. 21-23.

*Cyclophorus zebrinus*, *Pfr. Consp.* n. 969; *Pneum. Mon.* p. 71.

*Hab.* India. Khasya Hills (Benson).

(1451) *Cyclophorus tigrinus*.

Shell turbinate, solid striate, chestnut-coloured, marked with yellowish oblique streaks and angulated flames; spire raised, with the apex rather pointed; whorls 6, convex, with several spiral ribs, of which three usually are stronger, last whorl smooth beneath; umbilicus middle-sized, open; aperture oblique, nearly circular, yellowish-inside; peristome thickened with concentric furrows, shortly reflected, with the margins united by an equal deposit, columellar margin dilated and expanded over the umbilicus. Operculum thin. Height 21, greatest breadth 32, least br. 27 mill.

*Cyclostoma tigrinum*, *Sow. in Proc. Z. S.* 1843, p. 30; *Thes.* n. 100, p. 126, t. 29, f. 201-204; *Reeve, Conch. Syst.* ii. t. 183, f. 10; *Pfr. Ic.* n. 56, p. 61, t. 8, f. 13-16, t. 16, f. 17-20.

*Cyclophorus tigrinus*, *Pfr. in Z. f. M.* 1847, p. 107, n. 13, *Consp.* n. 97; *Gray, Cat. Cycl.* p. 18, n. 13; *Pfr. Pneum. Mon.* p. 72.

*Hab.* The Philippine Islands (H. Cuming).

Seven varieties of this beautiful shell are noticed by Mr. Sowerby.

(1452) *Cyclophorus zebra*.

Shell perforate, globose-conic, thick, sculptured with spiral lines and several thread-like raised keels, marbled with brown and whitish spire turbinate, blackish towards the summit, with the apex rather-pointed; whorls 5, convex, the penult one somewhat bunchy, the last one gridled with one white band; aperture oblique, ovate-circular, whitish inside; peristome nearly straight, doubled, thickened externally, with the margins united by a sinuate deposit; columellar margin reflected often half covering the very narrow umbilicus. Operc. pale. Height 15, greatest breadth 17, least br. 15 mill.

*Cyclostoma zebra*, *Grateloup, in Act. Board.* xi. p. 441, t. 3, f. 9; *Pfr. Ic.* n. 138, p. 132, t. 13, f. 31, 32.

*Cyclostoma Philippinarum*, var. *Sow. Thes.* t. 29, f. 205 207.

*Cyclophorus zebra*, *Pfr. in Z. f. M.* 1847, p. 107, n. 16; *Consp.* n. 100; *Gray, Cat. Cycl.* p. 19, n. 15; *Pfr. Pneum. Mon.* p. 74.

Smaller, fulvous, with the ridges smaller, blunt, one of which, below the middle, is usually stronger; preistome nearly simple, expanded. Height 9, greatest breadth 12, least br. 10 mill. *Pfr. Ic.* t. 43, f. 19, 21)

Smaller, whitish, with interrupted chestnut-coloured streaks, and often with one brown or fulvous basal band; peristoma more distinctly doubled and expanded. (*Pfr. Ic.* t. 43, f. 21, 22.)

*Hab.* The Philippine Islands.

(1453) *Cyclophorus Philippinarum*.

Shell perforate, conic solid, sculptured above with crowded spiral ridges, fulvous, with chestnut-coloured spots and interrupted streaks, and with two white reddish-brown articulated bands, one of which runs along the suture, and the other at the periphery spire conic, rather pointed; whorls 6, scarcely convex, the last one somewhat angulated, rather flattened and smooth beneath; aperture oval, whitish inside; peristome straight, rather thickened, with the margins distant, united by a deposit; columellar margin dilated in the middle towards the outer side. Operc. typical. Height 9, greatest breadth 10, least br. 9 mill.

*Cyclostoma Philippinarum*, *Sow. in Proc. Z. S.* 1842, p. 83 (part); *Spec. Conch.* f. 180, 183?; *Thes.* p. 125, n. 99, t. 29, f. 206; *Pfr. Ic.* p. 42, n. 33, t. 5, f. 17, 18; t. 13 f. 32-34.

*Cyclophorus Philippinarum*, *Pfr. in Z. f. M.* 1847, p. 107, n. 17; *Consp.* n. 101; *Gray, Cat. Cycl.* p. 19, n. 16; *Pfr. Pneum. Mon.* p. 74, *Hab.* The Philippine Islands (H. Cuming).

(1454) *Cyclophorus Guimarasensis*.

Shell subglobose-conoidal, rather thin, slightly striate, chestnut-coloured, spotted with yellowish and articulated with the same along the suture; spire short, rather pointed; whorls 5, convex, the last one angulated above by several obsolete spiral ridges, keeled at its periphery, convex and uniformly dark brown beneath; umbilicus narrow, scarcely going through; aperture nearly circular, somewhat pearly inside; peristome rather thin, white internally, shortly expanded, with the margins approximate; columellar margin strongly arcuate, rather reflected, operc. ? Height 12, greatest breadth 16, least br. 14 mill.

*Cyclostoma Guimarasense*, *Sow. Thes.* p. 131, n. 115, t. 31, f. 274, 275; *Pfr. Ic.* p. 99, n. 96 t. 82, 8, 9.

*Leptopoma* ? *Guimarasense*, *Pfr. in Z. f. M.* 1847, p. 109, n. 13.

*Cyclophorus Guimarasensis*, *Gray, Cat. Cycl.* p. 18, n. 14; *Pfr. Consp.* n. 102; *Pneum. Mon.* p. 75.

*Hab.* The Philippine island Guimaras (H. Cuming).

(1455) *Cyclophorus*? *turbinatus*.

Shell depressed-turbinate, rather solid, sculptured with very crowded spiral striæ and several obsolete ridges, fulvous, with a reddish-brown articulated band along the suture which is moderately impressed; spire conoidal, with the apex pointed, horn-coloured; whorls 6, convex, somewhat angulated, the last one rather flattened beneath; umbilicus middle-size, open; aperture oblique nearly circular; peristome white, double; inner edge shortly produced; outer edge shortly expanded, with the margins united into an angle; upper margin somewhat dilated forward. Operc. typical. Height  $8\frac{1}{2}$ , greatest breadth 14, least br. 12 mill.

*Cyclostoma helicoides*, Sow. in *Proc. Z. S.* 1843, p. 65; *Thes.* p. 127, n. 103, t. 30, f. 245, 246. Not *Grateloup*.

*Cyclostoma turbinatum*, Pfr. in *Z. f. M.* 1846 p. 38; *I.* p. 100, n. 97, t. 13, f. 17, 18.

*Cyclophorus turbinatus*, Pfr. in *Z. f. M.* 1847, p. 107, n. 18; *Consp.* n. 103; *Gray. Cat. Cycl.* p. 19, n. 17; *Pfr. Pneum. Mon.* p. 75.

*Hab.* The Philippine island Bohol (H. Cuming).

(1456) *Cyclophorus*? *triliratus*.

Shell globose-turbinate, thin, chestnut-coloured, with paler spots and stripes, and with yellow flames along the suture, partially covered with a longitudinally wrinkled hairy periostraca; spire conic, pointed; whorls  $5\frac{1}{2}$ , moderately convex, increasing rapidly, the penult one bearing two; the last whorl thread-like fringed ridges, of which one is on the upper side, the second at the periphery, and the third near below the second; umbilicus, narrow, open; aperture oblique, nearly circular; peristome rather simple shortly expanded, whitish, callous internally, with the margins approximate joined by callus. Operc. ? Height 6, greatest breadth 8, least br. 7 mill.

*Cyclostoma triliratum*, Pfr. *Ic.* n. 386, t. 47, f. 8-10.

*Cyclophorus*? *triliratus*, Pfr. *Consp.* n. 104, p. 53; *Pneum. Mon.* p. 76,

*Hab.* Labuan (Gruner).

(1457) *Cyclophorus validus*.

Shell depressed-turbinate, thick, rather smooth, with numerous obsolete spiral ridges above, chestnut-coloured, with oblique angulated yellow streaks; spire conoidal, blunt; whorls 5, convex, the last one rather coarsely eccentrically striate beneath; aperture oblique, nearly circular, blueish-white inside; peristome white or orange-coloured, thickened and somewhat expanded, with the margins angularly united by a thin deposit; columellar margin free, dilated and reflected over the umbilicus, which is very narrow. Operc. typical, with the margin of the whorls lamellar. Height 26, greatest breadth 40, least br. 33 mill.

*Cyclostoma validum*, Sow. in *Proc. Z. S.* 1842, p. 82; *Thes.* p. 123, n. 93, t. 27, f. 132, 133; *Pfr. Ic.* p. 189, n. 85, t. 11, f. 910, t. 16, f. 15, 16.

*Cyclophorus validus*, Pfr. in *Z. f. M.* 1847, p. 107, n. 5; *Consp.* n. 105; *Gray. Cat. Cycl.* p. 16, n. 5; *Pfr. Pneum. Mon.* p. 77.

*Hab.* The Philippine islands. Leyte, Luzon, Samar, and Mindanao (H. Cuming).

(1458) *Cyclophorus indicus*.

Shell turbinate-conic, solid, sculptured with numerous slightly-raised spiral ridges, whitish, marbled with brown and brownish-red; spire turbinate, rather pointed; whorls  $5\frac{1}{2}$ , convex, the last one more distinctly keeled below the middle and marked with a blackish band, rather smooth beneath; aperture somewhat oblique, nearly circular; peristome double; inner edge orange-coloured, shortly expanded; outer edge white, expanded, triangularly dilated above, with the columellar margin dilated, reflected, half covering the narrow umbilicus. Height 25, greatest breadth 38, least br. 32, mill.

*Cyclostoma indica*, Desh. in *Belanger Voy.* p. 415, t. 1, f. 4, 5; *Desh. in Lam. Hist.* viii, p. 363, n. 28.

*Cyclostoma indicum*, Müll. *Synops.* p. 38; *Pfr. Ic.* n. 229, t. 33, f. 3, 4.

*Cyclophorus indicus*, Pfr. *Consp.* n. 106; *Pneum. Mon.* p. 77.

*Hab.* The Island of Elephanta, near Bombay.

(1459) *Cyclophorus linguiferus*.

Shell depressed-turbinate, thick, obsoletely spirally striate, fulvous with angular brown spots; spire rather raised, with the apex blunt; whorls 5, convex, the last one ventricose beneath; umbilicus middle-sized, open; aperture nearly perpendicular, circular, milk-white inside; peristome rather thickened, doubled, broadly bordered with fulvous internally, with the upper margin scarcely expanded; columellar margin dilated into a semilunar lamina, which is narrowly protracted downward. Operc. typical, with five nearly equal volutions. Height 22, greatest breadth 32, least br. 25 mill.

*Cyclostoma linguiferum*, Sow. in *Proc. Z. S.* 1843, p. 31; *Thes.* p. 125, n. 98, t. 29, f. 980, *Pfr. I.* p. 168, n. 181, t. 23, f. 1, 3.

*Cyclophorus linguiferus*, Pfr. in *Z. f. M.* 1847, p. 107, n. 10; *Consp.* n. 107; *Gray. Cat. Cycl.* p. 19; n. 19, *Pfr. Pneum. Mon.* p. 78.

*Hab.* The Philippine Island of Bohol (H. Cuming).

(1460) *Cyclophorus canaliferus*.

Shell depressed-turbinate, solid, sculptured above and beneath with crowded spiral striæ, and with 7-8 blunt spiral ridges above, chestnut-coloured, spotted with white, and bearing an articulated white band along the suture, which is deeply channelled; with a whitish peripheral band, below which the shell is uniformly chestnut,



coloured, pale beneath; spire shortly raised, rather blunt; whorls 5, convex, the last one rather disjoined; umbilicus middle-sized, open; aperture small, rather oblique, nearly circular, shining and whitish inside; peristome thickened, shortly reflected, continuous, with the columellar margin expanded into a free, rather semicircular lamina. Operc. typical. Height 13, greatest breadth 26, least br. 22 mill.

*Cyclostoma canaliferum*, Sow. in *Proc. Z. S.* 1843, p. 81; *Spec. Conch.* f. 195, 196; *Thes.* p. 115, n. 71, t. 27, f. 140, 141; *Pfr. Ic.* p. 40 n. 32, t. 5, f. 14, 16.

*Cyclophorus canaliferus*, *Pfr. in Z. f. M.* 1847, p. 107, n. 14; *Consp.* n. 108; *Gray. Cat. Cycl.* p. 19, n. 13; *Pfr. Pneum. Mon.* p. 78.

Pale, spotted along the suture with chestnut, brown, and banded with the same below the middle.

Pale yellowish, with the spire reddish, and the last whorl marked with a single chestnut-coloured basal band.

With the lamina of the columellar margin less dilated, not semicircular.

*Hab.* The province Tayabas, Island of Luzon (H. Cuming); var. Borneo.

(1461) *Cyclophorus lingulatus*.

Shell somewhat depressed-conoidal, rather thin, nearly smooth, chestnut-coloured, with white articulated bands along the suture and at the periphery; spire short, acuminate; whorls 5, scarcely convex, the last one angulated above by 3—4 blunt spiral ridges, usually sharp-keeled at its periphery, convex beneath; umbilicus middle-size, funnel-shaped; aperture scarcely oblique, rather circular, blueish inside; peristome continuous, usually double; inner edge sharp, scarcely prominent; outer edge thickened, with the left margin surrounded with a wing, which is dilated above in a tongue-shaped lamina. Operc. typical, rather flat. Height 16, greatest breadth 21, least br. 18 mill.

*Cyclostoma lingulatum*, Sow. in *Proc. Z. S.* 1843, p. 64; *Thes.* p. 126, n. 101, t. 29, f. 203, 210; *Pfr. Ic.* p. 148, n. 182, t. 23, f. 6, 10.

*Cyclophorus lingulatus*, *Pfr. in Z. f. M.* 1847, p. 107, n. 15; *Consp.* n. 109; *Gray. Cat. Cycl.* p. 20, n. 20; *Pfr. Pneum. Mon.* p. 79.

*Hab.* The Philippine islands Siquijor, Bohol, Zebu (Cuming).

(1462) *Cyclophorus fulguratus*.

Shell depressed, turbinate, solid, obliquely substriate, very closely decussated under the lens, white, very elegantly painted above with angulated chestnut-coloured streaks; spire turbinate, with the apex rather blunt, horn coloured; whorls 5, convex, the last one rounded, with a white peripheral band, below which is another of blackish chestnut-colour; white round the umbilicus, which is narrow and scarcely going through; aperture slightly oblique, rather circular,

grayish and shining inside; peristome simple fulvous, interrupted with the margins united by a thin deposit, right and basal margin equally expanded; columellar margin dilated and expanded over the umbilicus. Operc. ? Height 19, greatest breadth 29, least br. 23 mill.

*Cyclostoma fulguratum*, *Pfr. in Proc. Z. S.* 1851; *Ic.* n. 361, t. 45, f. 9, 10.

*Cyclophorus fulguratus*, *Pfr. Cons.* n. 110, p. 45; *Pneum. Mon.* p. 80.

*Hab.* Ava.

Shell subturbinat; peristome expanded; axis imperforated or quite covered.

(1463) *Cyclophorus turbo*.

Shell top-shaped, rather thin, nearly smooth, white or yellowish, marbled with chestnut-coloured spots and stripes; spire turbinate, with the apex rather pointed; whorls 5, moderately convex, the last one angulated, sometimes distinctly keeled, rather flat beneath; aperture oblique, roundish, rather quadrangular, whitish inside; peristome thickened, slightly reflected, white, with the margins distant, united by a very thin callus; columellar margin expanded above into a lamina, which is quite appressed on and covers the umbilicus; basal margin terminating towards the columella into a prominent knot. Operculum yellowish horny. Height 16, greatest breadth 25, least br. 21 mill.

*Trochus turbo*, *Chemn. Conch. Cub.* ix 2. p. 53, t. 122, f. 1059.

*Helix turbo*, *Gmel. Syst.* p. 3642, n. 232.

*Cyclostoma turbo*, Sow. *Thes.* n. 75, p. 116, t. 25, f. 102, 103; *Pfr. Ic.* n. 148, p. 140, t. 10, f. 4. *Jay. Catal.* 1850, p. 260, n. 6014.

*Cyclostoma maculosa*, *Jay. Catal.* 139, p. 122, t. 7, f. 9, 10.

*Cyclophorus turbo*, *Pfr. in Z. f. M.* 1847, p. 108, n. 19. *Consp.* n. M.; *Gray, Cat. Cycl.* p. 20, n. 21. *Pfr. Pneum. Mon.* p. 80.

*Hab.* India, Tranquebar, and Coromandel (Chemnitz), Sumatra (Sowerby, Gray), Nicobar (Morch).

(1464) *Cyclophorus Amboinensis*.

Shell turbinate-depressed, solid, smooth, chestnut-coloured fulvous, sprinkled with white spots forming an interrupted band at the periphery; spire convexly conoidal, rather blunt; whorls  $4\frac{1}{2}$ , convex, the last one rounded, paler beneath; umbilicus narrow, open; aperture rather oblique, nearly circular, pale inside; peristome simple, somewhat thickened, almost imperceptibly expanded, with the margins united above into a slight angle. Operc. ? Height 10, greatest breadth 18, least br. 15 mill.

*Cyclostoma Amboinense*, *Pfr. in Proc. Z. S.* 1852; *Ic.* n. 400, t. 48, f. 20-22.

*Cyclophorus Amboinensis*, *Pfr. Pneum. Mon.* p. 82.

Smaller, chestnut-coloured, with indistinct pale stripes and bands; height  $8\frac{1}{2}$ , greatest

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breadth 14, least br.  $11\frac{1}{2}$  mill (*Pfr. Ic. t. 48 f. 23, 24.*)

*Hab.* Amboina.

(1465) *Cyclophorus ? caeloconus*.

Shell turbinate, thin, sculptured with crowded and rough radiating striæ, olivaceous yellowish, with a single reddish brown band below the periphery, and waving radiating streaks; spire conoidal, with the apex rather pointed; suture well impressed; whorls  $4\frac{1}{2}$ , very convex, last cylindrical; aperture oblique, ovate circular; peristome thin, sharp; umbilicus deep, showing all the whorls. Operc. ? Height 9, greatest breadth 13, least br. 11 mill. (*Bens.*)

*Cyclophorus caeloconus*, *Benson in Annals & Mag. 2nd, ser viii, 1851, p. 119; Pfr. Ic. n. 416, t. 50, f. 9, 10.*

*Cyclophorus ? caeloconus*, *Pfr. Consp. n. 113; Pneum. Mon. p. 83.*

*Hab.* India, the Neilgherries Mountains (*Jerdon.*)

(1466) *Cyclophorus ? obligatus*.

Shell small, thick, nearly globular, ash gray, narrowly perforate, girdled on both sides with equal sharp furrows and slight ribs, decussated by very minute striæ of growth; spire pointed; whorls 5, rounded; aperture small, ovate; peristome simple, thick. Height  $\frac{3}{8}$ , breadth  $\frac{5}{16}$  inch (*G.*)

*Cyclostoma obligatum*, *Gould, in Proc. Bost. Soc. 1847, p. 205; Exped. Shells, p. 38, ed. 1851, p. 104, f. 119.*

*Cyclophorus ? obligatus*, *Pfr. Consp. n. 117; Pneum. Mon. p. 84.*

*Hab.* The Island of Matea.

(1467) *Cyclophorus parvus*.

Shell depressed turbinate, rather thin, slightly striate, with 4 or 5 obsolete keels, fulvid whitish, with radiating brownish streaks; spire turbinate, with the apex rather pointed, horny; whorls 5-6, convex, the last one somewhat depressed, usually furnished with a more distinct keel round the funnel shaped umbilicus; aperture oblique, nearly circular; peristome rather simple, straight, with the margins united by a short deposit, which is somewhat emarginate; right margin forward, arcuate, prominent. Operc. horny, thick. Height  $5\frac{1}{2}$ , greatest breadth 9, least br.  $7\frac{1}{2}$  mill.

*Cyclostoma parvum*, *Sow. in Proc. Z. S. 1843, p. 66, Thes. n. 29, p. 101, t. 31, f. 254, 255; Pfr. Ic. n. 98, p. 100, t. 13 f. 15, 16.*

*Cyclophorus, parvus*, *Gray, Catal. Cycloph. p. 23, n. 37; Pfr. Consp. n. 118; Mon. p. 85.*

Smaller, brownish; height 3, greatest breadth 5, least br. 4 mill.

*Hab.* The Philippine Islands, Zebu and Panay (*H. Cuming*)

(1468) *Cyclophorus ? flavus*.

Shell conically globular, thick, yellow, closely sculptured with spiral furrows; spire conoidal rather pointed; whorls  $4\frac{1}{2}$ , convex, the last one

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ventricose; umbilicus extremely narrow, not going through; aperture ovate, slightly angulated above; peristome simple, blunt, with the margins joined by a deposit on penult whorl; columellar margin flattened. Operc. horny (*Bord.*) Height 7, greatest breadth 8, least br.  $6\frac{1}{2}$  mill.

*Cyclostoma flavum*, *Borderip, in Proc. Z. S. 1832, p. 59; Mull. Synops. p. 38; Sow. Thes. n. 55, p. 109, t. 24, f. 70; Pfr. Ic. n. 14, p. 23, t. 3, f. 9-11.*

*Chondropoma flavum*, *Gray, Catal. Cycl. p. 57, n. 7.*

*Cyclophorus ? flavus*, *Pfr. Consp. n. 119; Mon. p. 85.*

*Hab.* The Island Annaa (*H. Cuming.*)

(1469) *Cyclophorus oculus capri*.

Shell turbinate-depressed, solid, closely spirally striated and angulated by 4-5 blunt spiral ridges, marbled above with whitish and chestnut-colour, showing below the periphery a broad blackish band which is interrupted by white spots, pale beneath; spire short with the apex rather blunt; whorls 5-6, convex flattened along the suture; umbilicus broad, open; aperture rather oblique, nearly circular, somewhat pearly inside; peristome thickened, reflected, pale orange-coloured, slightly emarginated on the penult whorl. Operc. typical. Height 29, greatest breadth 52, least br. 40 mill.

*Helix oculus capri*, *Linn. Syst. ed. x. p. 768, n. 573; Mus. Lnd. Ulr. p. 664 n. 363, (Rumph. Must. t. 27, f. 0); Syst. ed. xii p. 1242, n. 657 (Argenv. Conch. t. 11, f. T.; Schræt. Einl. ii. p. 125, n. 3; Gmel. Syst. p. 3615, n. 6.*

*Helix oculus capri*, *Wood, Ind. t. 32, f. 7.*

*Cyclostoma oculus capri*, *Gray, in Mus. Brit. Reeve, Conch. Syst. t. 184, f. 11; Sow. Thes. n. 73, p. 115, t. 25, f. 96; Pfr. Ic. n. 18, p. 26, t. 3, f. 5, 6; Mouss. Jar. Moll. p. 52, t. 6, f. 2.*

*Cyclostoma Rafflesii*, *Bord. & Sow. in Zool. Journ. v. p. 50.*

*Cyclostoma indicum*, *Phil. Abbild. i. 5, p. 103, t. 1, f. 2, not Desh. nor Sow.*

*Cyclophorus oculus capri*, *Pfr. in Z. f. M. 1847, p. 108, n. 23; Consp. n. 122; Gray, Cat. Cycl. p. 20 n. 23; Pfr. Pneum. Mon. p. 87.*

*Hab.* Java.

(1470) *Cyclophorus semisulcatus*.

Shell turbinate-depressed, rather solid, marked above with 7-8 obtusely-raised keels, with crowded spiral striæ beneath, whitish, marbled above with brownish, showing below the periphery a single chestnut-coloured band, which often is paler towards the base; spire short, rather acuminate, with the apex blunt; whorls 5, convex, depressed near the suture, the last one angulated round the wide funnel-shaped umbilicus; aperture oblique, subcircular, shining, and blueish-white inside; peristome rather thickened, shortly expanded, white, with the margins joined into an angle by a continuous callus; columellar margin slightly



reflected. Operc. solid, with the margin of the whorls lamellar. Height 22, greatest breadth 43, least br. 33 mill.

*Cyclostoma semisulcatum*, Sow. in *Proc. Z. S.* 1843, p. 63; *Thes.* n. 95, p. 124, t. 25, f. 99; *Pfr. Ic.* n. 81, p. 86, t. 11, f. 1. 2.

*Cyclophorus semisulcatus* *Pfr.* in *Z. f. M.* 1847, p. 108, n. 24; *Consp.* n. 123; *Gray. Cat. Cycl.* p. 20, n. 24; *Pfr. Pneum. Mon.* p. 68.

*Hab.* Malacca.

(1471) *Cyclophorus Woodianus*.

Shell orbiculated-depressed, solid, sculptured on both sides with crowded spiral lines, and on the upper side with several more raised spiral ridges, chestnut-coloured, with whitish marble-painting above, marked along the suture with a broad white and brown articulated band, and with another white band on the periphery; dark brown beneath, pale round the broad and open umbilicus; spire short with the apex rather acuminate; whorls 5, convex depressed and slightly channelled along the suture; aperture nearly circular, blueish inside with the white band translucent; peristome thickened, white, shortly expanded, with the margins joined by a continued callus, forming a slight angle on the penult whorls. Operc. thin with lamellar edges of the whorls. Height 14, greatest breadth 30, least br. 24 mill.

*Cyclostoma Woodiana*, Lea. in *Trans. Am. Phil. Soc.* 1841, vii. p. 465, t. 12, f. 19.

*Cyclostoma Luzonicum*, Sow. in *Proc. Z. S.* 1842, p. 80; *Spec. Conch.* f. 133; *Thes.* n. 70, p. 114, t. 27, f. 136. 137.

*Cyclostoma Gironnieri*, Souleyet, in *Rev. Zool.* 1842, p. 101; *Voy. Bonite, Moll.* t. 30, f. 12-17.

*Cyclostoma Woodianum*, *Pfr. Ic.* n. 46, p. 53 t. 7, f. 1-3.

*Cyclophorus Woodianus*, *Pfr.* in *Z. f. M.* 1847, p. 108, n. 28; *Consp.* n. 126; *Gray. Cat. Cycl.* p. 21, n. 26; *Pfr. Pneum. Mon.* p. 88.

*Hab.* Luzon (H. Cuming).

(1472) *Cyclophorus Charpentieri*.

Shell depressed-turbinate, rather solid, sculptured above with close-set spiral striae and 4-5 blunt thread-like ridges, yellowish, with horny-brown marble paintings, and along the suture with a series of rather square chestnut-coloured spots, and with a broad brown band below the peripheral keel; spire shortly turbinate, with the apex rather blunt; whorls  $4\frac{1}{2}$ , enlarging rapidly, the last one somewhat depressed, nearly smooth beneath; umbilicus middle-sized; aperture oblique, rather circular, slightly angular above, flesh-coloured inside; peristome yellowish or reddish, continuous, shortly affixed, produced anteriorly, into a concentrically-striated tube. Height 15, greatest breadth 28, least br. 23 mill.

*Cyclostoma Charpentieri*, Mousson, *Jav. Mool.* p. 56, t. 6, f. 3.

*Cyclostoma involvulus*, var? *Pfr. Ic.* p. 30, t. 8, f. 10-12.

*Cyclophorus Charpentieri*, *Pfr. Consp.* n. 127; *Pneum. Mon.* p. 89.

*Hab.* Java.

*Note.* This shell differs from *C. involvulus* by its more depressed shape; the spiral ridges are more raised, the umbilicus wider, the aperture smaller, &c. It is more turbinate than *C. Woodianus*, and has more distinct keels, the umbilicus is smaller, the aperture more oblique, and the inner edge of the peristome is produced into a tube, which is elongate on the right, and shorter on the left side.

(1473) *Cyclophorus appendiculatus*.

Shell depressed, solid, sculptured with crowded raised spiral lines; 4-5 of which are a little stronger; whitish, with brownish marble painting, with a series of large, rather square, chestnut-coloured spots along the channelled suture, and with a pale band above the keel, which is not very distinct, and articulated with brown spots; spire very shortly conoidal, with the apex rather blunt, horny; whorls  $4\frac{1}{2}$ , enlarging rapidly, the last one broadly depressed near the suture; umbilicus wide open; aperture oblique, circular; peristome continuous, shortly affixed, equally expanded all round, with the left margin expanded into a tongue-shaped appendix. Height 15, greatest breadth 34, least br. 27 mill.

*Cyclostoma appendiculatum*, *Pfr.* in *Proc. Z. S.* 1851; *Ic.* n. 360, t. 45, f. 7. 8.

*Cyclostoma canaliferum*, var. Sow. *Thes.* t. 27, f. 142?

*Cyclophorus appendiculatus*, *Pfr. Consp.* n. 128, p. 54; *Pneum. Mon.* p. 90.

*Hab.* Philippine Islands.

(1474) *Cyclophorus Bairdi*, *Pfr.*

Shell depressed, nearly discoidal, solid, with close set spiral striae, fulvid-yellowish, painted with very numerous oblique angular chestnut-coloured stripes; spire scarcely raised, a little prominent in the middle; whorls  $4\frac{1}{2}$ , moderately convex, the last one somewhat depressed, very obtusely angulated and marked with a chestnut-coloured band at its periphery; umbilicus open, occupying a little more than one-third of the whole diameter; aperture oblique, roundish, rather angular, white inside; peristome rather simple, continuous, shortly affixed, slightly expanded, and produced above into an indistinct angle. Height 9, greatest breadth 26, least br. 20 mill.

*Cyclostoma Bairdi*, *Pfr.* in *Proc. Z. S.* 1852; *Ic.* n. 399, t. 48, f. 17-19.

*Cyclophorus Bairdi*, *Pfr. Pneum. Mon.* p. 91.

*Hab.* Ceylon.

(1475) *Cyclophorus stenostomus*.

Shell depressed, discoidal, solid, sculptured with very crowded winkled striae, chestnut-coloured, with whitish or fulvous spots and flames; spire rather flat; whorls 4-5, moderately con-

vex, enlarging rapidly, the last one slightly descending anteriorly; umbilicus wide and deep; aperture very oblique, irregularly roundish, slightly angular above, blueish inside; peristome whitish, blunt, double, the outer edge interrupted, straight, thickened; inner edge continuous, with the part adjacent to the penult whorls rectilinear. Height 6, greatest breadth 16, least br.  $12\frac{1}{2}$  mill.

*Cyclophorus stenostoma*. *Sow. Thes.* n. 13. p. 95. t. 31. f. 261; *Pfr. Ic.* n. 159, p. 149. t. 20. f. 23-25.

*Cyclophorus stenostoma*, *Pfr. in Z. f. M.* 1847. p. 108, n. 34; *Consp.* n. 131; *Gray. Cat. Cycl.* p. 21. n. 29; *Pfr. Pneum. Mon.* p. 92.

Larger; height 9, greatest breadth 26, least br. 21 mill. (*Pfr. Ic.* t. 20. f. 18. 19.)

*Hab.* Arabia, (Powis), India, Neilgherries, (Jerdon), the var. from Cochin-China?

(1476) *Cyclophorus loxostomus*.

Shell depressed, discoidal, rather solid, closely sculptured with thread-like striae, fuscous-fulvid-varied with paler spots; spire flat, with the subtle apex not prominent; whorls 5, moderately convex, increasing gradually, last rounded, dilated anteriorly, not descending; umbilicus broad, bowl-shaped, forming more than one-third of the total breadth; aperture diagonal, rather circular, pearly within; peristome continuous, shortly affixed, straight, indistinctly doubled, scarcely thickened. Height 4, greatest breadth  $13\frac{2}{3}$ , least br. 11 mill.

*Cyclostoma loxostomum*, *Pfr. in Proc. Z. S.* 1852; *Ic.* n. 406, t. 49. f. 11-13.

*Cyclophorus loxostomus*, *Pfr. Pneum. Mon.* p. 93.

*Hab.* Ceylon (Mr. Lear).

(1477) *Cyclophorus alternans*.

Shell conoidally depressed, rather thin, sculptured with crowded alternatively smaller and stronger sharp ridges, not shining, white, with a pale yellowish deciduous periostraca; spire very shortly conoidal, with the apex rather blunt; suture slightly channelled; whorls 5, moderately convex, last rounded; umbilicus middle-sized, conic; aperture little oblique, rather circular; peristome simple, straight, with a brownish edge, rather continuous, with the margins joined on the penult whorl by a shining callus. Operculum membranaceous, wax coloured. Height 10, greatest breadth 20, least br. 16 mill.

*Cyclostoma alternans*, *Pfr. in Proc. Z. S.* 1851; *Ic.* n. 324, t. 41, f. 30-32.

*Cyclophorus alternans*, *Pfr. Consp.* n. 134, p. 55; *Pneum. Mon.* p. 94.

*Hab.* Madagascar.

(1478) *Cyclophorus annulatus*.

Shell much depressed, nearly discoidal, rather solid, with slightly-wrinkled striae, white, with obsolete brownish spots above, and a single band below the periphery, covered with a thin, olivaceous, horn-coloured periostraca; spire flat, with

the minute apex scarcely prominent; whorls  $4\frac{1}{2}$ , moderately convex, the last one slowly descending; umbilicus broad and deep; aperture oblique, ovate-roundish; peristome rather simple, imperceptibly expanded all round, with the margins approximate, joined by a short callus and forming a slight angle below the middle of the penult whorl. Operculum thin. Height 6, greatest breadth 18, least br. 15 mill.

*Cyclostoma annulatum*, *Troschel MSS.*; *Pfr. in Z. f. M.* 1847. p. 150; *Ic.* n. 175, p. 162, t. 22, f. 17-19.

*Cyclophorus annulatus*, *Pfr. in Z. f. M.* 1847, p. 108, n. 33; *Consp.* n. 142; *Gray. Cat. Cycl.* pl. 22, n. 32; *Pfr. Pneum. Mon.* p. 98.

Larger; height 8, greatest breadth  $23\frac{1}{2}$ , least br. 19, mill. (*Pfr. Ic.* t. 29, f. 14, 15.)

*Cyclostoma discus*, *Sowerby MSS. olim.*

*Hab.* Ceylon (Dr. Hoffmeister).

(1479) *Cyclophorus ravidus*.

Shell nearly discoidal, slightly shining, coarsely sculptured with crowded, slight, radiating striae, white, covered with an olivaceous-yellowish periostraca; spire scarcely raised, with the apex flattened, blunt; suture impressed; whorls 4, moderately convex, enlarging slowly, the last one cylindrical, scarcely descending anteriorly, obsolete spirally striate above near the suture; umbilicus wide, open; aperture oblique, circular; peristome thin, straight, with the margins joined by a thin deposit. Operculum horny. Height 7, greatest breadth 15, least br. 13 mill. (Bens.)

*Cyclostoma ravidum*, *Bens. in Ann. and Mag.* 2nd ser. viii. 1851, p. 190; *Pfr. Ic.* n. 417, t. 50, f. 14-16.

*Cyclophorus ravidus*, *Pfr. Consp.* n. 143; *Pneum. Mon.* p. 99.

*Hab.* S. India, the summits of the Neilgherries (Jerdon).

(1480) *Cyclophorus Phonotopicus*.

Shell depressed, nearly discoidal, thin, not shining, sculptured with coarse, sharp, radiating raised lines, and decussated near the suture, with impressed spiral striae, which are scarcely perceptible under a lens; colour reddish-brown, with angular, interrupted streaks; spire depressed, with the apex prominent; suture impressed; whorls  $4\frac{1}{2}$ , convex enlarging gradually; umbilicus deep, rather open; aperture circular; peristome slightly expanded and reflected, rather duplicate above outer edge somewhat angulated. Operculum horny with 7-8 volutions. Height 4, greatest breadth 12, least br. 10 mill.

*Cyclostoma Phonotopicum*, *Benson in Annals and Mag.* 2nd ser. viii. 1851, p. 190; *Pfr. Ic.* n. 419, t. 50, f. 20, 21.

*Cyclophorus Phonotopicus*, *Pfr. Consp.* n. 145, *Pneum. Mon.* p. 100, 417.

*Hab.* India, Darjiling, Sikkim-Himalayah.

*Cyclophorus Haughteni*: Theobald. *Moulmein.*



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*Cyclophorus Siamensis*. Sowerby, *Teria Ghat*. (Khasia Hills) 2 sp.

*Cyclophorus Pearsoni*. Benson, *Lacat*. (Khasia Hills) 2 sp.

*Cyclophorus fulguratus*. Pfr. *Thaïet-mio*. Rangoon.

*Cyclophorus expansus*. Pfr. *Tenasserim Valley*.

*Cyclophorus turobrulus*. Mull. *Midnapur*.

*Cyclophorus zebrinus*, Benson, *Naucalai*. (92° 30'E. 25°15'N).

*Cyclophorus aurantiacus*, Schum.—Tenasserim valley, not common.

*Cyclophorus Theobaldianus*, B.—Tenasserim valley, Maulmein, Thaïet-mio. This shell is nowhere common. In the Tenasserim valley it equals *C. aurantiacus* in size, but is easily distinguished by its more depressed form, colourless peristome, and flexuous striation. It has the greatest range of any Cyclostomatous shell of the provinces.

*Cyclophorus Haughtoni*, mihi.—n s. Testa, simili, *C. aurantiaco* solida nitidiuscula; carinata, superne saturate castanea; in decorticatis speciminibus, spiral lineis albidis ziczac variegata. Carina, catenata alternate albida et castanea. Periomphalo albido, fasciis nonnullis castaneis spirallibus lineato. Peristomate vix pallidissime ochraceo, ore interiori cærulescente—Maulmein.

Size—  
1.70 Major } diameter in inches. This shell  
1.85 Minor }

I have much pleasure in naming after Captain Haughton, to whom I am indebted for some fine shells. It occurs abundantly at the "farm caves," and is at once distinguished from all other Tenasserim Cyclophori, by its parti-coloured funiculate keel, which is not the result of abrasion but is best seen in specimens covered by the epidermis.

*Cyclophorus expansus*, Pfr.—Tenasserim valley. Not rare. This shell varies much in size, from  
1.70 0.80  
— to —  
1.26 0.65

*Cyclophorus affinis*, mihi.—b. s. Testa, subgloboso-turbinata: umbilicata, solidiuscula, castaneo-marmorata, band nitida, vix carinata, peristomate reflexo, forti, expansiusculo, distorto, pallidissime

flavescente, intus cærulescente —to—  
1.60 1.40  
1.36 1.12  
Maulmein.

This shell has no very marked character, unless a distortion in the peristome, one-third from its sutural margin, should prove constant. But two specimens were obtained, of which the measurements are given above.

*Cyclophorus fulguratus*, Pfr.—Thaïet-mio, Rangoon, very common. This fine shell is not rare at Rangoon and becomes very abundant near Thaïet-

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mio. It varies much in size and colour, some specimens are almost colourless  
1.80 1.30  
— to —  
1.03 0.85

*Cyclophorus cryptomphalus*. B.—Ava. Procured by Mr. Oldham. does not seem to be a plentiful species.

*Cyclophorus scurra*. B.—Pegu (province.)

*Cyclophorus balteatus*. B.—Pegu (province.)

*Cyclophorus scissimargo*. B.—Phaïethan. Not common.

*Cyclophorus calyx*. B.—Akowtong, on the Irrawaddie, not common.

*Cyclophorus cornu-venatorium*. Sav.—Ava. Procured by Mr. Oldham.

*Cyclophorus perdix*. Sav. (Not obtained by me).

## *Leptopoma*, Pfeiffer.

*L. aspirans*, B.—Tenasserim valley, very common.

*L. Birmanum*. Pfr.—(Not noticed by me.)

Sub-genera, *Pterocyclos* (rupestris) rec. 16, sp. *Pterocyclos rupestris*. India and Ceylon.

## CYCLOSTOMIDÆ.

### *Pterocyclos*. Benson.

*P. pullatus*, B.—Akowtong (on the Irrawaddi R.) Not uncommon.

*P. cetra*, B.—Maulmein and Phaïethan (on the Tenasserim R.) Not common.

(1481) *Pterocyclos anguliferus*.

Shell discoidal, solid, smooth, blackish-chestnut-coloured, with irregular white flames; spirally flat; whorls 5, little convex, the last one not descending anteriorly; umbilicus broad; aperture oblique, rather circular, fulvous and pearl-shining inside; peristome double; inner edge shortly expanded, scarcely indented above; external edge white, broadly expanded, dilated above near the penult whorl into a blunt beak, which is deeply excavated beneath. Operculum conic; with 3-4, whorls bearing a spiral lamella, and the apex smooth. Height 6½, greatest breadth 24, least br. 18 mill.

*Cyclostoma angulifera*, Soleyet. in *Rev. Zool.* 1841, p. 347; *Voy. de la Bonite*, t. 30. f. 6-11.

*Cyclostoma anguliferum*, Petit, in *Journ. Conch.* i. p. 43.

*Pterocyclos anguliferum*, Pfr. in *Z. f. M.* 1847, p. 111; 1851, p. 6; *Id.* p. 196. t. 24, f. 3-6, *Consp.* n. 49; *Pneum. Mon.* p. 44.

*Hab.* Cochin-China.

(1482) *Pterocyclos tenuilabiatum*.

Shell depressed, subdiscoidal, solid, striate, and with transverse impressions on all sides, brownish, marmorated with darker chestnut-coloured angulose stripes; spire flat, rather concave, with the apex a little prominent; whorls 4½, moderately convex, rapidly increasing, the last one rather depressed; umbilicus broad; aperture diagonal, nearly circular; peristome double;

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internal edge shortly produced, a little indented above; external edge nearly continued, white, with the columellar margin shortly reflected; right margin dilated, expanded; upper margin raised like a cap near the penult whorl. Operc? Height  $6\frac{1}{2}$ , greatest breadth 26, least br. 21 mill.

*Cyclostoma tenuilabiatum*, Metcalf, in *Proc. Z.* 8. 1851.

*Pterocyclos tenuilabiatum*, Pfr. *Consp.* n. 50; *Pneum. Mon.* p. 45.

*Hab.* Borneo.

(1483) *Pterocyclos hispidus*.

Shell discoidal, solid, very minutely decussated by the striæ of growth, and crowded, raised, concentric lines, white, covered with a spinulose periostraca of a greenish-brown colour with darker lines; spire flat; whorls  $5\frac{1}{2}$ , rather depressed, the last one descending anteriorly, bearing at a distance of 7-8 mill. behind the aperture a triangular beak, which is scarcely opened, recurved and touching the suture; umbilicus broad; aperture oblique, nearly circular, blueish-white inside; peristome double; internal edge a little expanded and incumbent with a triangular notch above; external edge expanded, dilated above in a flattened cap near the penult whorl. Operc. with the apex flattened, spiral lamella narrow with 3-4 whorls. Height 8, greatest breadth 28, least br.  $22\frac{1}{2}$  mill.

*Spiraculum hispidum*, Pearson, in *Journ. As. Soc.* ii. p. 391, t. 20.

*Pterocyclos hispidus*, Bens. in *Journ. As. Soc.* v. p. 355; *Ann. and Mag.* 2nd ser. i. p. 346; *Pfr. in Z. f. M.* 1851, p. 6; *Consp.* n. 52; *Gray. Cat. Cycl.* p. 12, n. 2; *Pfr. Pneum. Mon.* p. 46.

*Pterocyclos Prinsepi*, Pfr. in *Z. f. M.* 1847, p. 111; *Id.* p. 195, t. 24, f. 7-10; *Gray. Cat. Cycl.* p. 12, n. 1.

*Steganotoma Prinsepi*, v. d. Busch, in *Phil. Abild.* i. 5, p. 106; *Cycl.* t. 1, f. 6.

*Cyclostoma spiraculum*, Sow. *Thes.* n. 59, p. 110, t. 31, f. 270-272; *Petit, in Journ. Conch.* i. p. 43.

*Hab.* India, the Himalayan region; Khasya Hills. (Benson).

(1484) *Pterocyclos rupestris*.

Shell depressed, nearly discoidal, rather solid, horn-coloured-whitish, slightly striate, with angular chestnut-coloured stripes above, and a band of the same colour at the periphery; spire nearly flat, prominent in the middle; whorls not quite 6, convex, wrinkled near the suture, which is deeply impressed, the last whorl cylindrical, not descending anteriorly; umbilicus broad; aperture oblique, nearly circular; peristome double; inner edge straight, deeply indented above; outer edge rather expanded, dilated and convex over the incisure. Operculum typical, with a little raised spiral lamina. Height 8, greatest breadth 22, least br. 19 mill.

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*Pterocyclos rupestris*, Benson, in *Journ. As. Soc.* i. p. 11, t. 2; *Ann. and Mag.* 2d ser. i. p. 346; *Pfr. in Z. f. M.* 1851, p. 4; *Id.* t. 31, f. 3-5; *Consp.* n. 53; *Pneum. Mon.* p. 46; *Gray, Cat. Cycl.* p. 12, n. 3.

*Pterocyclos pictus*, Trosch in *Z. f. M.* 1847, p. 45; *Pfr. ibid.* p. 111; *Id.* 194, t. 24, f. 21-25; *Gray, Cat. Cycl.* p. 13, n. 5.

*Steganotoma picta*, Trosch in *Wieg. Arch. f. Nat.* 1837, i. p. 165, 3, t. f. 12, 13.

*Steganotoma pictum*, Philippi, *Abild.* i. 5, p. 105; *Cyclost.* t. 1, f. 5.

*Cyclostoma* ... Sow. *Conch. Mon.* f. 531?

*Cyclostoma pictum*, Petit, in *Journ. Conch.* i. 43.

Smaller; height  $6\frac{1}{2}$ , greatest breadth 14 mill. (*Pfr. Id.* t. 31, f. 9-11.)

*Hab.* India, Patharghata, province of Bahar.

(1485) *Pterocyclos nanus*.

Shell depressed, discoidal, whitish, painted with a peripheral chestnut-coloured band and waving streaks above; spire slightly prominent, darker; whorls  $4\frac{1}{2}$ , convex, the last one detached above; umbilicus deep and open; aperture oblique, circular; peristome double, with the edges scarcely separated by a slightly-impressed groove; inner edge deeply and straightly indented above; outer edge slightly reflexed, forming, above the sinus, a narrow vaulted wing, which is shortly descending and angulated anteriorly. Operculum? Height 5, breadth 10 mill. (Benson).

*Pterocyclos nanus*, Benson in *Ann. and Mag.* N. H. 2nd ser. viii. p. 450; *Pfr. Pneum. Monogr.* p. 47; *Id.* t. 49, f. 31-33.

*Hab.* India, the Neilgherries Mountains.

(1486) *Pterocyclos parvus*.

Shell depressed, rather solid, slightly striate, horn-coloured yellowish, with chestnut-coloured angular stripes above and a denticulated band of the same colour at the periphery; spire nearly flat, with the apex scarcely elevated; whorls  $4\frac{1}{2}$ , moderately convex, the last one cylindrical, descending anteriorly, paler beneath; umbilicus broad; aperture oblique, circular; peristome double; inner edge shortly produced, emarginate above by a nearly circular sinus; outer edge rather broad, reflected, white, angularly receding, ascending and dilated into the shape of a cap over the sinus. Operc. Height 5, greatest breadth 14, least br.  $11\frac{1}{2}$  mill.

*Spiraculum parvum*, Pearson in *Journ. As. Soc.* ii. p. 392, t. 20.

*Pterocyclos parvus*, Bens. in *Journ. As. Soc.* v. p. 357; *Ann. and Mag.* 2nd ser. i. p. 346; *Pfr. in Z. f. M.* 1851, p. 5; *Id.* t. 31, f. 12-14. *Consp.* n. 54, *Pneum. Mon.* p. 48.

*Cyclostoma spiraculum* var., Sow. *Thes.* t. 31, f. 273?

*Pterocyclos rupestris* (part.), Gray, *Cat. Cycl.* 12, n. 3.

*Hab.* India, the Khasya Hills. (Benson).



## MOLLUSCA.

### (1487) *Pterocyclos Cumingi*.

Shell depressed, solid, slightly striate, shining, fulvous-yellow, with angular chestnut-coloured stripes, which are broader and darker near the periphery, so as to form two interrupted bands; spire flat; whorls 5, convex, the last one cylindrical, swollen anteriorly next the penult one into an elongated ridge, which is rounded above and surrounded by a furrow; umbilicus very broad; aperture a little oblique, nearly circular; pearly inside; peristome rather simple, white, thickened, reflected, interrupted above by a triangular incisure, and produced into a small inflected tongue. Operc. typical, with a small, blunt nucleus. Height 6, greatest breadth 32, least br. 22 mill.

*Pterocyclos Cumingi*, *Pfr. in Proc. Z. S.* 1851; and *Z. f. M.* 1851, p. 5;  *Ic. t.* 31, f. 6-8; *Consp. n.* 55; *Pneum. Mon.* p. 48.

*Hab.* Ceylon.

### (1488) *Pterocyclos bilabiatus*.

Shell depressed, nearly discoidal, slightly striate, whitish, with angular chestnut-coloured stripes; spire scarcely raised, with the apex rather blunt, blackish; whorls 5—5½, moderately convex, gradually increasing, the last one cylindrical with a brown band at the periphery; umbilicus broad; aperture oblique, circular; peristome double; inner edge nearly continued, straight, deeply notched above, outer edge vaulted into the shape of a cape near the penult whorl, with the right and basal margins deeply sinuous and undulated. Operc. typical. Height 8½, greatest breadth 20, least br. 17 mill.

*Pterocyclos bilabiatus*, *Bens. in Zool. Journ.* v. p. 462; *Journ. As. Soc.* v. p. 358; *Pfr. in Z. f. M.* 1847, p. 111, 1851, p. 4;  *Ic. p.* 93, t. 24, f. 11-14; *Consp. n.* 56; *Gray, Cat. Cycl.* p. 13, n. 6; *Pfr. Pneum. Mon.* p. 49.

*Cyclostoma bilabiatum*, *Sow. Thes. n.* 57, p. 110, t. 25, f. 81, 82; *Petit. in Journ. Conch. i.* p. 43.

*Hab.* India, Salem, near Madras (Heath, Sowerby.)

### (1489) *Pterocyclos Blandi*.

Shell orbiculate-depressed, whitish, with radiating, undulated, brownish-orange-coloured stripes, and one darker band at the periphery; whorls 4½, increasing rapidly, the last one suddenly dilated into a broad wing anteriorly; umbilicus very broad; aperture oblique; peristome rather duplicate; inner edge thickened, disjoined, and sinuous above; outer edge broadly expanded above, with a wing, which is disjoined, angulate anteriorly, descending, produced over the penult whorl, showing a sinus posteriorly. Greatest breadth 29, least br. 23 mill. *Bens.*

*Pterocyclos Blandi*, *Bens. in Ann. & Mag.* viii. 1851, *Aug. t.* 5, f. 1; *Pfr. Consp. n.* 58; *Pneum. Mon.* p. 49.

*Hab.* Island of Pulo Sussan, near Pulo Penang.

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### (1490) *Pterocyclos? biciliatus*.

Shell orbicular, flattened above, largely umbilicated beneath, very thin, nearly membranaceous, with sharp and hairy transverse striae, yellowish, painted with angular fulvous stripes; spire depressed; suture very deep; whorls 4½, cylindrical, with two obsolete angles, and two rows of incurved black hairs, the last one deflected; aperture oblique, circular (incomplete); the upper angle bearing a lamina with two channels. Height 7, greatest breadth 14.2, least br. 11.5 mill. (M.)

*Pterocyclos biciliatus*, *Monsf. Juv. Moll. p.* 49, t. 20, f. 9.

*Pterocyclos? biciliatus*, *Pfr. Consp. n.* 47; *Pneum. Mon.* p. 50.

*Cyclostoma biciliatum*, *Petit. in Journ. Conch. i.* p. 43.

*Hab.* India; Birmah.

This shell seems to be very nearly allied to *Cyclotus Taylorianus*, and perhaps it may be the same species.

### (1491) *Pterocyclos? incomptus*.

Shell depressed, solid, coarsely striate, opaque, white, with a deciduous brownish-horn-coloured periostraca; spire little raised, with the apex prominent; whorls 5, rapidly increasing, the last one cylindrical, obsoletely angulated; umbilicus very broad; aperture diagonal, nearly circular; peristome simple, with the columellar margin thickened, shortly affixed, separated by a deep notch from the upper one, which is dilated like a wing. Operc. Height 15, greatest breadth 40, least br. 32 mill.

*Cyclostoma incomptum*, *Sow. Thes. Suppl. n.* 133, p. 160; t. 31, A. f. 298, 299.

*Pterocyclos incomptus*, *Pfr. in Z. f. M.* 1851, p. 9;  *Ic. t.* 31, f. 1, 2; *Consp. n.* 45; *Pneum. Mon.* p. 42.

*Hab.* India? (Sowerby); Brazils (Cuming).

### (1492) *Pterocyclos brevis*.

Shell conoid-semiglobose, solid, slightly striate, a little shining, chestnut-coloured, with fulvous spots and stripes; spire short, rather blunt; suture broadly impressed, bordered; whorls 5, convex, the last one angularly, compressed round the broad and funnel-shaped umbilicus; aperture rather circular, white inside; peristome thickened, reflected, produced above in a triangular beak, which is closely pressed to the penult whorl, deeply channelled internally, and forms externally a broad, prominent, knot. Operculum blackish. Height 22, greatest breadth 36, least br. 30 mill.

*Lituus brevis*, *Martyn, Fig. of non-descar. Shells*, t. 21, c. ed. *Chenu, (Bibl. Conch. ii.)*, p. 21, t. 8, f. 2.

*Turbo Petiverianus*, *Gray, in Wood, Ind. Suppl. t.* 6, f. 2.

*Cyclostoma Petiverianum*, *Gray, in Wood, Suppl. p.* 36; *Sow. Spec. Conch. f.* 97, 98; *Thes. n.* 74, p. 116, t. 25, f. 100, 101; *Reeve, Conch.*

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*Syst.* ii. t. 184, f. 15; *Petit in Journ. Conch.* i. p. 43.

*Cyclostoma breve*. *Pfr. Ic.* p. 116. n. 180. t. 24. f. 1. 2.

*Myxostoma Petiveranum*. *Trosch. in Z. f. M.* 1847. p. 45.

*Myxostoma breve*. *Pfr. ibid.* p. 111; *Gray. Cat. Cycl.* p. 15. n. 1.

*Pterocyclos brevis*. *Pfr. in Z. f. M.* 1851. p. 9; *Consp.* n. 46; *Pneum. Mon.* p. 42.

*Hab.* India, Pulo Condore.

(1493) *Pterocyclos planorbulus*.

Shell depressed, discoidal, rather solid, striate, and irregularly foveate fulvous, with crowded angular reddish-brown radiating lines; spire flat, with the apex scarcely prominent; suture deep, channelled; whorls 5, moderately convex, the last one nearly cylindrical, with a blackish band at the periphery, white round the very broad umbilicus; aperture oblique, rather circular, bluish-white inside; peristome double; inner edge shortly expanded, indented above with a triangular notch; external edge scarcely broader, expanded, dilated into a disjoined wing above the notch. Operc. like that of *C. brevis*. Height 12, greatest breadth 39, least br. 31 mill.

*Cornu venatorium*, *Chemn. Conch.* ix. P. ii. p. 104, t. 127, f. 1132, 33?

*Cyclostoma planorbula*, *Lam. in Encycl. Meth.* t. 461, f. 3; *Lam. Hist.* vi. p. 143. n. 1. ed. *Desh.* viii. p. 353; *Desh. in Encycl. Meth.* ii. p. 39. n. 1; *Desh. Traite elem. Conch.* t. 82, f. 3. 4.

*Cyclostoma planorbulum*, *Voigt. in Cuv. Thier.* iii. p. 177; *Sow. Thes.* t. 25, f. 83; *Pfr. Ic.* t. 29, f. 16, 17 *Petit. in Journ. Conch.* i. p. 43.

*Cyclotus planorbulus*, *Swains. Malac.* p. 336; *Gray. Cat. Cycl.* p. 8. n. 14. (part).

*Pterocyclos planorbulus*, *Pfr. Consp.* n. 47; *Pneum. Mon.* p. 43.

*Hab.* Java? Borneo?

(1494) *Pterocyclos Troscheli*.

Shell orbiculate-depressed; whorls 4, slowly increasing, the last one rather dilated anteriorly; umbilicus very broad; peristome thickened, reflected, obsoletely sinuate anteriorly and above, with a cucollated wing, which is angulated and deflected anteriorly, adhering to the penult whorl. Operculum convex, horn-coloured. Greatest breadth 20, least br. 13 mill.

*Pterocyclos Troscheli*, *Bens. in Ann. & Mag.* viii. 1851, Aug. t. 5. f. 2; *Pfr. Consp.* n. 48; *Pneum. Mon.* p. 44.

*Hab.* Ceylon, Trincomalee (Bland.)

*Pterocyclos hispidus*. *Pearson. Teria Ghat.* (3 sp.).

*Cyclotus (fuscescens) rec.* 44 sp. also fossil.

(1495) *Cyclotus semistriatus*.

Shell turbinate-depressed, rather thin, upper side with crowded minute spiral lines, whitish, brownish-marbled; lower side smooth, whitish, with fine spiral furrows in the umbilicus, which is about half the diameter of the spire, conical, rather

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acuminate; whorls 4-5, rounded, the last one scarcely descending anteriorly; aperture oblique, ovate-rounded; peristome straight, sharp; its margins on the penult whorl angularly joined by a short callus; right margin a little sinuate; columellar margin a little reflexed. Operc? Height  $8\frac{1}{2}$ , greatest breadth  $15\frac{1}{2}$ , least br. 11 mill.

*Cyclostoma semistriatum* *Sow. in Proc. Z. S.* 1843, p. 29; *Thes.* p. 91, n. 3, t. 23, f. 6, *Pfr. Ic.* p. 147, n. 156, t. 20, f. 10-12.

*Cyclostoma fasciatum*. *Hutt. Mss. in Mus. Brit.*

*Cyclostoma album*, *Hutt. in Mus. Brit.*

*Aperostoma semistriatum*. *Pfr. in Z. f. M.* 1147. p. 104.

*Cyclotus semistriatus*, *Gray. Cat. Cycl.* p. 10. n. 26; *Pfr. Consp.* n. 10; *Mon.* p. 22.

*Hab.* India. Poonah and Meemuch; also Ceylon?

(1496) *Cyclotus Fortunei*.

Shell turbinate-depressed, rather solid, faintly striated, fulvous, minutely marbled with chestnut-colour and with a single band of the same below the periphery; spire very short, turbinate, with a very small apex; suture simple; whorls  $4\frac{1}{2}$ , convex, last cylindrical, not descending; umbilicus conical, deep, forming about a quarter of the total breadth; aperture nearly perpendicular, rather circular, slightly angulated above; peristome simple; straight, shortly affixed to the penultimate whorl. Operculum typical, with the raised margin of the whorls threadlike. Height 7, breadth  $12\frac{1}{2}$  mill.

*Cyclostoma Fortunei*, *Pfr. in Proc. Zool. Soc.* 1852; *Ic.* n. 404, t. 49, f. 3-5.

*Cyclotus Fortunei*, *Pfr. Pneum. Monogr.* p. 30.

*Hab.* China, Shanghai (Mr. Fortune.)

(1497) *Cyclotus subdiscoideus*.

Shell depressed, rather solid, covered with crowded spiral lines on the whole surface, opaque of a pale flesh-colour, marked above with pale brownish spots, which are arranged in stripes; spire very shortly turbinate; with the apex nipple-shaped; whorls  $4\frac{1}{2}$ -5, convex, the last one nearly cylindrical, descending anteriorly; umbilicus broad; aperture nearly diagonal, circular, flesh-coloured inside; peristome simple, with the margins almost contiguous, upper margin sinuate, a little expanded; columellar margin shortly reflected. Operc. nearly flat, with the margins of the whorls sharply raised. Height 8, greatest breadth 17, least br.  $13\frac{1}{2}$  mill.

*Cyclostoma subdiscoideum*, *Sow. Thes. Suppl.* n. 184, p. 161, t. 31, B. f. 304, 305; *Pfr. Ic.* n. 325, t. 41, f. 33, 34.

*Cyclostoma rusticum*, *Pfr. in Proc. Zool. Soc.* 1851.

*Cyclotus Pfeifferi*, *Gray. Cat. Cycl.* p. 9. n. 20 (not described).



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*Cyclotus subdiscoidens*, *Pfr. Consp.* n. 26; *Mon.* p. 31, 415.

*Cyclostoma aratum*, *Bens. in Ann. Mag.* New ser. viii. p. 190.

*Cyclotus aratus*, *Pfr. Consp.* n. 27; *Mon.* p. 31.

*Hab.* East India, the province Northern circars. (Jerdon).

(1498) *Cyclotus conoideus*.

Shell globose-turbinate, thin, marmorated and banded with pale brownish and reddish-brown, girdled with raised spiral lines, and sometimes with one or two more distinct keel; spire conical rather pointed; suture deep, somewhat crenate, or reddish-brown-spotted; whorls  $4\frac{1}{2}$ , convex, the last one more distinctly furrowed around the umbilicus, which is somewhat funnel-shaped and of a middle size; aperture nearly circular, of the same colour, and shining inside; peristome sharp, thin, a little expanded, with the margins nearly contiguous, joined into an angle by a short callus. Operculum of 5 whorls. Height 8, greatest breadth  $10\frac{1}{2}$ , least breadth 9 mill (*Pf.*)

*Cyclostoma spurcum*, *Sow. in Proc. Z. S.* 1843, p. 63; *Thes.* n. 26, p. 99, t. 24, f. 75, 76, Not *Grateloup*.

*Cyclostoma conoideum* *Pfr. in Z. f. M.* 1846, p. 44; *Ic.* n. 99, p. 101, t. 13, f. 19-21.

*Cyclostoma varium*, *Barcl. MSS.* ?

*Tropidophora conoidea*, *Pfr. in Z. f. M.* 1847, p. 107.

*Cyclotus conoideus*, *Gray. Cat. Cycl.* p. 10, n. 25; *Pfr. Consp.* n. 30; *Pneum. Mon.* p. 33.

*Hab.* Seychelles Islands (Sowerby); South-America (Fitzroy, Gray). Mauritius (Barclay).

(1499) *Cyclotus pusillus*.

Shell suborbicular, thin, slightly striate, nearly smooth, diaphanous, pale greenish; spire short, raised in the middle, mucronate; whorls  $4\frac{1}{2}$ , convex, the last one deflected, nearly disjointed anteriorly, more distinctly striate beneath; umbilicus broad, open; aperture little oblique, nearly circular, white and shining inside; peristome continued, rather simple, a little expanded, somewhat emarginate at the penult whorl, with the right margin forward arcuate. Operc. typical. Height 6, greatest breadth 11, least br. 9 mill.

*Cyclostoma pusillum*, *Sow. in Proc. Z. S.* 1843, p. 59; *Thes.* n. 10, p. 94, t. 23, f. 5, 5; *Pfr. Ic.* n. 53, p. 59, t. 7, f. 16, 17.

*Aperostoma pusillum*, *Pfr. in Z. f. M.* 1847, p. 104.

*Cyclotus pusillus*, *Gray. Cat. Cycl.* p. 9, n. 18; *Pfr. Consp.* n. 33; *Pneum. Mon.* p. 34.

*Hab.* Philippine Islands, Luzon and Negros, (H. Cuming).

(1500) *Cyclotus scalaris*.

Shell conoidal, rather solid, obliquely and slightly striate, a little shining horn-coloured yellow; spire raised, stair-like, with the apex pointed; suture deep; whorls  $4\frac{1}{2}$ , very much rounded,

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the last one cylindrical, a little disjointed anteriorly; umbilicus narrow, open; aperture oblique, circular, pearly inside; peristome simple, continued, scarcely expanded on all sides, Operc? Height  $6\frac{1}{2}$ , greatest breadth 9, least br. 7 mill.

*Cyclostoma scalare*, *Pfr. in Proc. Z. S.* 1851, *Ic.* n. 328, t. 41, f. 38, 39.

*Cyclotus scalaris*, *Pfr. Consp.* n. 34, p. 50; *Pneum. Mon.* p. 35.

*Hab.* Philippine Islands.

(1501) *Cyclotus hebraicus*.

Shell rather depressed, nearly orbicular, slightly striate, nearly smooth, pale brownish-whitish, often with brown stripes and spots above; spire short, rather blunt; whorls  $4\frac{1}{2}$ -5, convex, the last one with a chestnut-coloured band below the periphery, nearly disjointed anteriorly; umbilicus broad, quite open; aperture nearly circular; peristome continued, duplicate; internal edge short, straightforward, external edge a little expanded, angular, inflected and dilated above. Operc. typical, Height 12, greatest breadth 22, least br. 18 mill.

*Valvata hebraica*, *Less. Voy. de la Coquille*, p. 347, t. 13, f. 8.

*Cyclostoma papua*, *Quoy & Gaim. Voy. Astrol.* ii. p. 185, t. 12, f. 23-26, *Desh. in Lam. Hist.* viii. p. 369, n. 35; *Hombr. Jacq. Voy. Pol. Sud. Moll.* t. 12, f. 16-19.

*Cyclostoma distomella*, *Sow. Thes.* n. 68, p. 114, t. 25, f. 94; *Pfr. Ic.* n. 91, p. 95, t. 12, f. 4, 5, t. 28, f. 14, 15.

*Aperostoma distomella*, et *hebraicum*, *Pfr. in Z. f. M.* 1847, p. 104.

*Cyclophorus?* *papua*, *Pfr. ibid.* p. 108.

*Cyclotus distomellus*, *Gray. Cat. Cycl.* p. 7, n. 9.

*Cyclotus hebraicus*, *Gray. Cat. Cycl.* p. 8, n. 10; *Pfr. Consp.* n. 35; *Pneum. Mon.* p. 35.

*Hab.* New Guinea.

(1502) *Cyclotus?* *discoideus*.

Shell discoidal, rather solid, slightly striate, white with a pale yellow periostraca; spire quite depressed, with the apex scarcely prominent; suture deep; whorls  $4\frac{1}{2}$ , cylindrical, the last one descending anteriorly; umbilicus broad; aperture circular, white inside; peristome double; internal edge short, appressed; outer edge rather thickened with the right margin broadly expanded. Operc.? Height 7, greatest breadth 20, least br. 15 mill.

*Cyclostoma discoideum*, *Sow. Thes.* n. 60, p. 111, t. 25, f. 87, 88; *Pfr. Ic.* n. 153, p. 144, t. 20, f. 1-3; *Mouss. Jav. Moll.* p. 50, t. 20, f. 10.

*Aperostoma discoideum*, *Pfr. in Z. f. M.* 1847, p. 104.

*Cyclotus discoideum*, *Gray. Cat. Cycl.* p. 8, n. 11; *Pfr. Consp.* n. 36; *Pneum. Mon.* p. 36.

*Hab.* Demerara (Sowerby); Malang, Fava? (Mousson.)

(1503) *Cyclotus?* *opalinus*.

Shell orbicular, flattened above, very broadly umbilicate or concave beneath, diaphanous,

smooth, very shining, white somewhat opaline; whorls 5, cylindrical, the last one equalling  $\frac{3}{4}$  of the whole diameter; spire scarcely prominent; suture deep; aperture disjoined from the penult whorl, perfectly circular; peristome continued, duplicate; outer edge expanded, somewhat reflected. Operc? Height 93; greatest breadth 21. 2; least br. 17. 2. mill. (M.)

*Cyclostoma opalinum*, *Mouss. Jav. Moll.* p. 51, t. 5, f. 12.

*Cyclotus? opalinus*. *Pfr. Consp.* n. 37; *Pneum. Mon.* p. 36.

*Hab.* Malang, Fava (Zollinger).

(1504) *Cyclotus mucronatus*.

Shell orbicular, rather thin, a little roughly striate, pale brownish; spire very short, mucronate; whorls  $4\frac{1}{2}$ , rapidly increasing, convex, the last one a little deflected and nearly disjoined anteriorly; umbilicus broad, open; aperture oblique, circular, brownish-white inside; peristome continued, double; inner edge short, straight; outer edge somewhat expanded, sinuate above, spirally striate inside. Operc. typical. Height 7, greatest breadth 15, least br. 13 mill.

*Cyclostoma mucronatum*. *Sow. in Proc. Z. S.* 1843, p. 63, *Thes.* n. 66, p. 113, t. 25, f. 91; *Pfr. Ic.* n. 52, p. 51, t. 7, f. 11-13.

*Aperostoma mucronatum*, *Pfr. in Z. f. M.* 1847, p. 104.

*Cyclotus mucronatus*, *Gray. Cat. Cycl.* p. 8, n. 12; *Pfr. Consp.* n. 38; *Pneum. Mon.* p. 37.

*Hab.* Calanang, island of Luzon (H. Cuming).

(1505) *Cyclotus substriatus*.

Shell orbicular, slightly mucronate, rather solid, brownish, distinctly radiating striate near the suture; spire flattened, raised in the middle into a small point; whorls  $4\frac{1}{2}$ , convex, the last one a little deflected anteriorly; umbilicus broad, open; aperture oblique, circular, fulvous inside; peristome somewhat duplicate; inner edge affixed; outer edge a little thickened and shortly expanded, concentrically striate, with an indistinct external angle near the penult whorl. Operc. typical. Height  $6\frac{1}{2}$ , greatest breadth 14, least br. 11 mill.

*Cyclostoma substriatum*, *Sow. in Proc. Z. S.* 1843, p. 61; *Thes.* n. 67, p. 113, t. 25, f. 95; *Pfr. Ic.* n. 51, p. 57, t. 7, f. 18-20.

*Aperostoma substriatum*, *Pfr. in Z. f. M.* 1847, p. 104.

*Cyclotus substriatus*, *Gray. Cat. Cycl.* p. 9, n. 16; *Pfr. Consp.* n. 39; *Pneum. Mon.* p. 37.

*Hab.* The Philippine Island, Siquijor (H. Cuming).

(1506) *Cyclotus corniculum*.

Shell small, depressed conic, broadly umbilicate beneath, thin, pale, yellowish, transversely painted with brown angular lines; whorls  $4\frac{1}{2}$ , cylindrical, rapidly increasing, the last one equalling  $\frac{1}{2}$  of the whole diameter; spire a little prominent; suture simple, deep; aperture somewhat disjoined, circular; peristome duplicate; outer edge rather expanded. Operc. typical.

Height 6, greatest breadth 9.5, least br. 8 mill. (M.)

*Cyclostoma corniculum*, *Mouss. Jav. Moll.* p. 51, t. 5, f. 11.

*Cyclotus corniculum*. *Pfr. Consp.* n. 40; *Pneum. Mon.* p. 38.

*Hab.* Pardana, Fava (Zollinger).

(1507) *Cyclotus plebejus*.

Shell depressed, globular, rather thin, striate, violaceous-brownish; spire shortly turbinate, rather pointed; whorls 4, convex, rapidly increasing, the last one somewhat inflated, whitish near the suture and behind the aperture; umbilicus narrow, open; aperture oblique, circular, chestnut-coloured inside; peristome continued, sharp, forming a duplicate angle at its junction with the penult whorl. Operc. typical. Height  $8\frac{1}{2}$ , greatest breadth 12, least br.  $10\frac{2}{3}$  mill.

*Cyclostoma plebejum*, *Sow. in Proc. Z. S.* 1843, p. 60; *Thes.* n. 12, p. 94, t. 24, f. 40; *Pfr. Ic.* n. 50, p. 55, t. 7, f. 14, 15.

*Aperostoma plebejum*, *Pfr. in Z. f. M.* 1847, p. 104.

*Cyclotus plebejus*, *Gray. Cat. Cycl.* p. 7, n. 7. *Pfr. Consp.* n. 41; *Pneum. Mon.* p. 38.

*Hab.* Island of Luzon, the province Laguna (H. Cuming).

(1508) *Cyclotus variegatus*.

Shell discoidal, rather solid, minutely striate, pale fulvous, uniform, or with chestnut-coloured stripes, bands or square spots; spire flattened with the apex not prominent, often blackish; whorls  $4\frac{1}{2}$ , moderately convex, the last one cylindrical; umbilicus very broad and open; aperture a little oblique, circular; peristome double; inner edge short, continued; external edge rather expanded, dilated above and auriculate near the penult whorl. Operc. typical. Height  $6\frac{1}{2}$ , greatest breadth  $20\frac{1}{2}$ , least br. 17 mill.

*Cyclostoma planorbulum*, *Sow. Genera of Sh. Cyclot.* f. 1; *Sow. Thes.* n. 58, p. 110, t. 25, f. 85; *Pfr. Ic.* n. 174, p. 161, t. 22, f. 6-16. Not Lamarck.

*Cyclostoma cornu venatorium*, *Pet. in Journ. Conch.* i. p. 43.

*Cyclotus variegatus*, *Swains. Malac.* p. 336, *Pfr. Consp.* n. 43; *Pneum. Mon.* p. 39.

*Aperostoma planorbulum*, *Pfr. in Z. f. M.* 1847, p. 104.

*Cyclotus planorbulus*, *Gray. Cat. Cycl.* p. 8, n. 14, (part).

*Hab.* Philippine Islands (H. Cuming).

(1509) *Cyclotus Taylorianus*.

Shell depressed, nearly discoidal, thin, minutely striate, scarcely shining, whitish, with very elegant chestnut-coloured angulated stripes, and a fulvous-horn-coloured periostraca; spire nearly flat, with the apex horn-coloured, mucronate; suture deep; whorls 5, convex, the last one with two obsolete angles, each of which is furnished with a series of long black hairs, scarcely deflected anteriorly, bearing a small beak-like recurved



spiraculum on the suture, at the distance of 4 mill. behind the peristome; umbilicus very broad; aperture very oblique, nearly circular; peristome rather duplicate; inner edge expanded, affixed, sometimes indistinct; outer edge rather notched near the penult whorl; left margin shortly reflected; right margin broadly expanded; upper margin dilated, roof-like. Operculum like that of *C. variegatus*. Height 6, greatest breadth 17, least br. 13 mill.

*Cyclostoma Taylorianum*, *Pfr. in Z. f. M.* 1851, p. 7; *Ik. n.* 285, t. 38, f. 27-29, t. 43, f. 1-3.

*Cyclostoma Charbonnieri*, *Recher. in Journ. Conch.* 1851, ii. p. 214, t. 5, f. 12, 13.

*Cyclotus Taylorianus*, *Pfr. Consp. n.* 32; *Pneum. Mon.* p. 40

*Hab.* Borneo, Sarawak.

Compare with *Pterocyclos biciliatus*, *Mousson*. (1510) *Cyclotus rostellatus*.

Shell depressed, rather solid, slightly striate, horn-coloured, with fulminating chestnut stripes; spire very shortly turbinate, with the apex mucronate, black; whorls  $4\frac{1}{2}$ , convex, the last one descending anteriorly, bearing a beak-like recurved spiraculum 5 mill. behind the peristome; umbilicus moderately broad; aperture very oblique, nearly circular; peristome double, reddish; inner edge continued, a little expanded, affixed to the outer one, which is reflected into the plane of the aperture, very narrow below the penult whorl, shortly and convexly dilated above. Operc. typical. Height 5, greatest breadth 11, least br. 9 mill.

*Cyclostoma rostellatum*, *Pfr. in Z. f. M.* 1851, p. 8, *Ik. n.* 286, t. 38, f. 30-34.

*Cyclotus rostellatus*, *Pfr. Consp. n.* 44; *Pneum. Mon.* p. 40.

*Hab.* Singapore (saylor).

This species differs from *C. Taylorianus* by its spire, which is rather turbinate, by the more deflected last whorl, by the umbilicus, which is much narrower, by the more distinctly duplicate peristome, and by the greater distance of the spiraculum from the peristome. Compare with *Pterocyclos spiracellum*.

*Leptopoma (perlucidum)*, *rec.* 29 sp.

(1511) *Leptopoma vitreum*.

Shell globose-conical, thin, obliquely and slightly striate, decussated, under a lens, with crowded spiral lines, shining, pellucid, whitish or yellow, uniform or painted with brownish streaks, flames and bands; spire conoidal, rather pointed; whorls 5, convex, enlarging rapidly, the last one globular, with the axis very narrowly perforated; aperture oblique, roundish, subulate; peristome simple, sharp, shortly expanded, with distant margins; columellar margin slightly dilated and expanded, rather protracted in the middle into an angle. Height 14, greatest breadth 13, least br.  $13\frac{1}{2}$  mill.

*Cyclostoma vitrea*, *Lesson, Voy. de la Coquille*,

p. 346, t. 13, f. 6; *Desh. in Lam. Hist. ed. alt.* viii. p. 367, n. 31.

*Cyclostoma lutea*, *Quoy. & Gaim. Voy. Astro-labe.* ii. p. 180, t. 12, f. 11-14.

*Cyclostoma nitidum*, *Sowerby, in Proc. Z.* 8. 1843, p. 60; *Thes. n.* 121, p. 133, t. 29, f. 225-227; *Reeve. Conch. Syst.* t. 183, f. 2; *Pfr. Ic.* n. 92, p. 96, t. 16, f. 10.

*Cyclostoma vitreum*, *Pfr. Ic. Z. t.* 28, f. 16-18 *Mouss. Jav. Moll.* p. 57, t. 6, f. 4.

*Leptoma nitidum*, *Pfr. in Z. f. M.* 1847, p. 108, n. 6; *Gray. Cat. Cycl.* p. 24, n. 2.

*Leptopoma vitreum*, *Pfr. in Z. f. M.* 1847, p. 108, n. 8, *Consp. n.* 147; *Gray. l. c.* p. 24, n. 4; *Pfr. Pneum. Mon.* p. 101.

Smaller, rather solid, uniformly greenish white, with 5 whorls; height 8, greatest breadth 10, least br. 8 mill.

Shell uniformly glassy, or pale yellowish, with a single chestnut-coloured band and similar flame-paintings above; size like (*Pfr. Ic.* t. 12, f. 27-29).

*Cyclostoma lutea*, *Lesson Voy. Coquille*, p. 344, t. 13, f. 5?

*Hab.* New Guinea (Lesson), New Ireland and Moluccas (Quoy), Philippine Islands (H. Cuming) Java (Mousson); the var. from India, the Neilgherries Mountains.

(1512) *Leptopoma perlucidum*.

Shell globose-conical, thin sculptured with very close-set spiral striae, flesh-coloured-whitish, girdled very elegantly with greenish fulvid spiral lines; spire turbinate, pointed; whorls 5, convex, the last one ventricose; umbilicus narrow; aperture scarcely oblique, nearly circular, fulvous inside; peristome white, thin, broadly expanded with distant margins, columellar margin scarcely dilated, half covering the umbilicus. Height 13, greatest breadth 18, least br. 14, mill.

*Cyclostoma perlucida*, *Grateloup, in Act. Bord.* xi. p. 442, t. 3, f. 13.

*Cyclostoma concinnum*, *Sowerby in Proc. Z.* 8. 1843, p. 61; *Thes. n.* 122, p. 134, t. 29, f. 223, 224; *Delessert, Recueil*, t. 38, f. 14; *Chenu Ill. Conch.* t. 1, f. 18.

*Cyclostoma perlucidum*, *Pfr. Ic.* n. 11, p. 19 t. 2, f. 8-10, to 16, f. 18.

*Leptopoma perlucidum*, *Pfr. in Z. f. M.* 1847, p. 108, n. 4; *Consp. n.* 148, *Gray. Cat. Cycl.* p. 23, n. 1; *Pfr. Pneum. Mon.* p. 103.

*Hab.* The Philippine Islands, Bobol. Mindanao, Camiguin (H. Cuming.)

(1513) *Leptopoma melanostomum*.

Shell perforate, globose-conical, thin, smooth, shining, rather translucent, white; spire conical, pointed; whorls  $5\frac{1}{2}$ , convex, the lower ones sometimes banded with reddish-brown lines, the last one ventricose, not descending; aperture rather oblique, circular; peristome interrupted, black, with the right and lower margins expanded into the plane of the aperture, columellar margin rather indented. Height  $9\frac{1}{2}$ , greatest breadth 12, least br. 9 mill.

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*Cyclostoma melanostoma*, *Petit*, in *Revue Zool.* 1841, p. 308; *Guer. Mag.* 1842, t. 56; *Hombr. & Jacq. Voy. Pol. Sud. Moll.* t. 12, f. 20-24; *Pfr. Ic.* n. 189, p. 173, t. 25, f. 12-15.

*Leptopoma melanostoma*, *Pfr.* in *Z. f. M.* 1847, p. 108, n. 5; *Consp.* n. 150; *Gray, Cat. Cycl.* p. 24, n. 7.

*Leptopoma melanostomum*, *Pfr. Pneum. Mon.* p. 104.

*Hab.* New Guinea.

(1514) *Leptopoma luteostomum*.

Shell perforate, globose-conical, thin, girdled with distant, slightly-raised spiral lines, pellucid, white or fulvous; spire conical, pointed; whorls 5, convex, last ventricose; aperture oblique, nearly circular; peristome angularly reflected into the plane of the aperture, orange-coloured, with the margins approximate, joined by a thin, callus; columellar margin dilated into an indistinct angle. Height 8, greatest breadth 10, least br. 8 mill.

*Cyclostoma luteostoma*, *Sow.* in *Proc. Z. S.* 1843, p. 63; *Thes.* n. 125, p. 135, t. 30, f. 223, 229.

*Cyclostoma luteostomum*, *Pfr. Ic.* n. 93, p. 96, t. 12, f. 21-23.

*Leptopoma luteostoma*, *Pfr.* in *Z. f. M.* 1847, p. 101, n. 9; *Consp.* n. 151; *Gray, Cat. Cycl.* p. 24, n. 5.

*Leptopoma luteostomum*, *Pfr. Pneum. Mon.* p. 104.

*Hab.* The Philippine Islands of Guimaras (H. Cuming).

(1515) *Leptopoma immaculatum*.

Shell perforate, globose-conical, thin, very closely spirally striate, diaphanous whitish painted sometimes with chestnut-coloured points, spots or streaks; spire conical, pointed; whorls 5½, convex, the last one furnished above with several obsolete ridges, and with a single stronger keel on the periphery, convex beneath; aperture scarcely oblique, rather circular; peristome thin, broadly expanded, with distant margins; columellar margin dilated in the middle, but not covering the umbilicus, which is exceedingly narrow, and not pervious. Height 12, greatest breadth 17, least br. 12 mill.

*Turbo immaculatus*, *Chemn. Conch. Cab.* ix p. ii p. 57, t. 123, f. 1063.

*Turbo marginellus*, *Gmel. Syst.* p. 3602, n. 102.

*Turbo lævis*, *Wood. Ind. Suppl.* t. 6, f. 5.

*Cyclostoma læve*, *Gray.* in *Wood. Suppl.* p. 36; *Sow.* in *Proc. Z. S.* 1843, p. 63; *Thes.* n. 120, p. 133, t. 29, f. 220-222; *A. Adams and Reeve. Voy. Samarang. Moll.* p. 57, t. 14, f. 3.

*Cyclostoma immaculatum*, *Sow. Spec. Conch.* Pt. ii. *Cycl.* f. 124; *Beech. Voy.* p. 146, t. 38, f. 29; *Pfr. Ic.* n. 13, p. 22, t. 3, f. 7, t. 4, f. 7, t. 7, f. 23, 24, t. 16 f. 9.

*Cyclostoma immaculata*, *Lea. Observ.* ii. p. 68, 23, f. 87.

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*Cyclostoma maculosa*, *Souleyet.* in *Rev. Zool.* 1842, p. 101; *Voy. Bonite*, t. 30, f. 38-41.

*Cyclostoma azaolanum*, *Sow. MSS. olim.*; *Jay Catal.* 1850, p. 250, n. 5812.

*Cyclostoma marginellum*, *Kuster.* in *Chem.* t. 4, f. 7, n. *Index*.

*Leptopoma immaculatum*, *Pfr.* in *Z. f. M.* 1847, p. 108, n. 3; *Consp.* n. 152; *Gray Cat. Cycl.* p. 25, n. 8; *Pfr. Pneum. Mon.* p. 105.

*Hab.* The Philippine Island (H. Cuming). Celebes, Manado (A. Adams).

(1516) *Leptopoma latelimbatum*.

Shell perforate, globose-conical, thin, sculptured with very minute spiral striæ and rather equidistant obtuse ridges, diaphanous, somewhat shining, white, marbled with pale fulvous spots and bands; spire turbinate, rather pointed; whorls 5, moderately convex, enlarging rapidly, last rounded, slightly keeled on the periphery with a sharply-raised line; umbilicus narrow, scarcely going through; aperture oblique, nearly circular; peristome white, double, inner edge interrupted, shortly produced, with the margin joined by a thin callus; outer edge equally dilated all round and expanded into the plane of the aperture, except near the perforation, where it is cut out. Height 11, greatest breadth 17, least br. 13 mill.

*Cyclostoma latelimbatum*, *Pfr.* in *Proc. Z. S.* 1851; *Ic.* n. 297, t. 40, f. 1, 2.

*Leptopoma latelimbatum*, *Pfr. Consp.* n. 153, p. 57; *Pneum. Mon.* p. 106.

*Hab.* The Philippine Islands.

(1517) *Leptopoma Massenæ*.

Shell perforate, globose-conical, rather thin, with close-set spiral striæ, shining, whitish, varied with rusty-brownish spots and lines; spire conical, rather pointed; suture deep; whorls 5, convex, the last one keeled on the periphery, furnished above with four raised lines (which are obsolete on the upper whorls), rather smooth and little convex beneath; aperture rather oblique, circular, slightly angular; peristome simple, white, interrupted, expanded into a right angle, with the columellar margin emarginated below its insertion. Height 9, greatest breadth 11, least br. 9 mill.

*Cyclostoma Massenæ*, *Lesson, Voy. Coquille*, p. 346, t. 13, f. 7.

*Cyclostoma multilabris*, *Quoy & Gaim. Voy. Astrol.* iv. p. 183; t. 12, f. 20-22.

*Cyclostoma multilabre*, *Pfr. Ic.* t. 28, f. 20 22. (From Quoy.)

*Leptopoma Massenæ*, *Pfr.* in *Z. f. M.* 1847, p. 108, n. 2; *Consp.* n. 154; *Gray, Cat. Cycl.* p. 24, n. 6; *Pfr. Pneum. Mon.* p. 107.

Monstrous variety, with the peristome multiplied.

*Cyclostoma multilabris*, *Lam. Hist.* vi. p. 153, n. 25; *Ed. Desh.* viii. *Deless. Recueil.* t. 29, f. 14; *Chemn. Ill. Conch. Livr.* 73, t. 1, f. 14.



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*Cyclostoma multilabre*, *Pfr. Ic.* n. 195, p. 177, t. 29, f. 4, 6. (From Deless)

*Leptopoma multilabre*, *Pfr. in Z. f. M.* 1847, p. 109, n. 19; *Gray, Cat. Cycl.* p. 27, n. 17.

*Hab.* New Guinea (Lesson); New Holland (Lamarek).

(1518) *Leptopoma sericatum*.

Shell perforate, globose-conical, thin, pellucid silk-shining, sculptured with rather distant oblique lines and with 4-5 raised spiral lines above, glassy-whitish, with the ridges horn-coloured; spire turbinate, with the apex pointed, blackish; whorls 5, the upper ones somewhat convex, the last one ventricose, slightly keeled, marked below the keel, with a single chestnut-coloured band, sculptured beneath with several more obsolete spiral ridges; umbilicus excessively narrow, not pervious; aperture rather oblique, nearly circular, slightly emarginated; peristome simple, interrupted, thin, expanded into the plane of the aperture, with the columellar margin tongue-shaped in the middle. Height 9, greatest breadth 12, least br. 10 mill.

*Cyclostoma sericatum*, *Pfr. in Proc. Z. S.* 1851; *Ic.* n. 300, t. 40, f. 7, 8.

*Lepotoma sericatum*, *Pfr. Consp.* n. 154, p. 57; *Pneum Mon.* p. 108.

Smaller, with  $4\frac{1}{2}$  whorls, violaceous-fulvid, paler beneath; height  $7\frac{1}{2}$ , greatest breadth 10, least br. 8. mill. *Pfr. Ic.* t. 40, f. 11, 12.

*Hab.* Borneo (Taylor).

(1519) *Leptopoma Panayense*.

Shell perforate, globose-conical, very thin, nearly smooth, silk-shining, girdled with distant hair-like spiral ridges, pale fulvous, varied with chestnut-colour; spire short, conoidal, rather blunt; whorls 5, moderately convex, enlarging rapidly, the last keeled; aperture rather oblique, nearly circular, pearly inside; peristome simple, sharp, blueish-white, with a brownish edge, with the margins distant; right and basal margins arcuate, broadly and angularly expanded; columellar margins short, nearly rectilinear, reflected above, slightly ariculate at its base. Height 10, breadth 13 mill.

*Cyclostoma Panayense*, *Sow. in Proc. Z. S.* 1843, p. 62; *Thes.* n. 123, p. 134, t. 30, f. 239; *Pfr. Ic.* n. 162, p. 151, t. 20, f. 28, 29.

*Leptopoma Panayense*, *Pfr. in Z. f. M.* 1847, p. 108, n. 11; *Consp.* n. 156; *Gray, Cat. Cycl.* p. 25, n. 10; *Pfr. Pneum. Mon.* p. 108.

*Hab.* The Philippine Islands of Panay and Samar (H. Cuming).

(1520) *Leptopoma perplexum*.

Shell umbilicate, conoidal, rather thin, very minutely decussated under a lens, rather angulated, by equidistant obsolete keels slightly shining, uniformly whitish or varied with bands and spot of a yellow periostraca; spire short, conoidal, pointed; whorls  $5\frac{1}{2}$ , moderately convex, the last one more flattened beneath; aperture oblique,

## MOLLUSCA.

truncate-ovate, shining and white inside; peristome callus, thickened, expanded, with distant margins, joined by a rather thickened callus; columellar margin dilated and slightly reflected in the middle. Height 10, greatest breadth 16, least br. 13 mill.

*Cyclostoma perplexum*, *Sow. in Proc. Z. S.* 1844, p. 62; *Thes.* n. 127, p. 186, t. 30, f. 243, 244; *Pfr. Ic.* n. 136, p. 130, t. 16, f. 11, 12.

*Leptopoma perplexum*, *Pfr. in Z. f. M.* 1847, p. 109, n. 14; *Consp.* n. 157; *Gray, Cat. Cycl.* p. 25, n. 12; *Pfr. Pneum. Mon.* p. 109.

*Hab.* Island of Luzon, Albulug (H. Cuming).

(1521) *Leptopoma acutimarginatum*.

Shell depressed-turbinate, rather thin, slightly obliquely striate, olivaceous-brownish, marbled and banded with white; spire short, conical, rather pointed; whorls 5, moderately convex, the last one sharply keeled, more convex beneath; umbilicus narrow, scarcely pervious; aperture nearly circular, white and shining inside, with the external painting translucent; peristome not quite continuous, white or yellow, expanded all round, with the columellar margin slightly thickened and reflected. Height 18, greatest breadth 29, least br.  $23\frac{1}{2}$  mill.

*Cyclostoma acutimarginatum*, *Sow. in Proc. Z. S.* 1842, p. 80; *Thes.* n. 95, p. 124, t. 27, f. 138, 139; *Reeve, Conch. Syst.* t. 183, f. 7; *Pfr. Ic.* n. 133, p. 128, t. 15, f. 19-22.

*Leptopoma acutimarginatum*, *Pfr. in Z. f. M.* 1847, p. 109, n. 21; *Consp.* n. 158; *Gray, Cat. Cycl.* p. 27, n. 20; *Pfr. Pneum. Mon.* p. 110.

*Hab.* Island of Samar, Catbalonga (H. Cuming).

(1522) *Leptopoma helicoides*.

Shell top-shaped, thin, whitish, sometimes painted with minute brownish lines, or striped and marbled with chestnut-colour; spire conical, painted; whorls 6, rather flat, with 5-6 obsolete spiral ridges, the last one sharply keeled on its periphery, moderately convex on both sides, smooth beneath; umbilicus excessively narrow, not pervious; aperture oblique, ovate, rather circular, somewhat pearly inside; peristome thin, expanded and reflected, with distant margins; columellar margin slightly sinuate. Height 16, greatest breadth 21, least br.  $17\frac{1}{2}$  mill.

*Cyclostoma helicoides*, *Grateloup, in Act. Soc. Linn. Bord.* xi. p. 442, t. 3, f. 14; *Pfr. Ic.* n. 134, p. 129, t. 15, f. 25, 26, t. 16, f. 1-3.

*Cyclostoma Stainforthii*, *Sow. in Proc. Z. S.* 1842, p. 80; *Thes.* n. 129, p. 136, t. 29, f. 215, 216, t. 30, f. 217, *Reeve, Conch. Syst.* t. 183, f. 6.

*Leptopoma helicoides*, *Pfr. in Z. f. M.* 1847, p. 109, 29; *Consp.* n. 159; *Gray, Cat. Cycl.* p. 27, n. 19; *Pfr. Pneum. Mon.* p. 110.

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*Hab.* The Philippine Islands, Ticao, Masbate, Siquijor, Panay (H. Cuming)

## (1523) *Leptopoma insigne*.

Shell rather conoidal, very thin, membranous, silk-shining, horny olivaceous; spire conical, pointed; whorls 5, convex, the upper ones smooth, the two last obliquely striate, with four spiral ridges above, the last one very broad, sharply keeled on the periphery, ventricose beneath, with two scarcely prominent ridges; aperture little oblique, roundish, sublunate, somewhat pearly inside; peristome simple, shortly reflected, with distant margins; columellar margin white, slightly dilated, half covering the umbilicus, which is extremely narrow. Height 11, greatest breadth 15, least br. 12 mill.

*Cyclostoma insigne*, Sow. in *Proc. Z. S.* 1843, p. 62; *Thes.* n. 132, p. 138, t. 30, f. 232; *Pfr. Ic.* n. 107, p. 107, t. 12, f. 19, 20.

*Leptopoma insigne*, *Pfr. in Z. f. M.* 1847, p. 108, n. 10; *Consp.* n. 160; *Gray, Cat. Cycl.* 25, n. 9; *Pfr. Pneum. Mon.* p. 111.

*Hab.* Island of Mindoro, Calapan (H. Cuming).

## (1524) *Leptopoma ciliatum*.

Shell depressed turbinata, rather thin, slightly striate, chestnut-coloured, with fulvid streaks and spots; spire conoidal, with the apex pointed; whorls 5, moderately convex, the last one keeled on the periphery, furnished on the keel, with a single row of close set hairs, more flattened beneath; aperture oblique, nearly circular, whitish inside; peristome simple, slightly expanded, with distant margins; columellar margin shortly reflected. Height 8, breadth 12 mill.

*Cyclostoma ciliatum*, Sow. in *Proc. Z. S.* 1840 p. 65; *Thes.* n. 102, p. 127, t. 30, f. 237, 238; *Pfr. Ic.* n. 161, p. 150, t. 20, f. 26, 27.

*Leptopoma ciliatum*, *Pfr. in Z. f. M.* 1847, p. 109, n. 12; *Consp.* n. 161, *Gray, Cat. Cycl.* p. 25, n. 11; *Pfr. Pneum. Mon.* p. 112.

*Hab.* The province of South Camarinas, Island of Luzon (H. Cuming).

## (1525) *Leptopoma ciliferum*.

Shell turbinata conical, umbilicate, slightly keeled, thin transversely striate, reddish brown; spire very acuminate, with the suture perspicuous, whorls 6, rather flat on both sides, girdled above with five raised ridges, the last one rather inflated with the keel becoming obsolete, sculptured with scaly striae of growth, produced on the keel into long hairs, moderately convex beneath, furnished with slightly raised lines, which are more distinct towards the umbilicus; aperture nearly circular, angular above, with the margin double; outer edge rather membranaceous, reflected; inner edge straight. Height 9.4, greatest breadth 11, least br. 9 mill.

*Cyclostoma ciliferum*, *Mousson, Jar. Moll.* p. 56, t. 7, f. 3.

*Leptopoma ciliferum*, *Pfr. Consp.* n. 162; *Pneum. Mon.* p. 112.

*Hab.* Java.

# MOLLUSCA.

## (1526) *Leptopoma undatum*.

Shell very narrowly perforate, globose conical, thin, spirally and very closely striate, diaphanous whitish, painted irregularly with brownish waving streaks; spire elongate conic, with the apex rather pointed; whorls  $5\frac{1}{2}$ , scarcely convex, the last one large, sharply keeled below the middle, convex on both sides; aperture diagonal, ovate-roundish; peristome thin, with distant margins; right margin broadly reflected into the plane of the aperture; columellar margin shortly reflected. Height 12, greatest breadth 15, least br.  $11\frac{1}{2}$  mill.

*Cyclostoma undatum* *Metcalf, in Proc. Z. S.* 1851.

*Leptopoma undatum*, *Pfr. Consp.* n. 163; *Pneum. Mon.* p. 111.

*Hab.* Borneo.

## (1527) *Leptopoma fibula*.

Shell perforate, top-shaped, thin, slightly striate and obliquely faveolate, uniformly white or painted with horn-coloured angular stripes; spire conical, pointed; whorls 5-6, rather flat, girdled with unequal raised lines; last whorl rather convex, more distinctly keeled at the lower periphery; umbilicus narrow, half covered; aperture large, very oblique, truncatedly ovate; peristome expanded, with distant margins, joined by a thin callus; right margin almost rectilinear; basal margin slightly arcuate; columellar margin rather perpendicular, dilated and reflected. Height 16, greatest breadth 19, least br. 12 mill.

*Cyclostoma fibula*, Sow. in *Proc. Z. S.* 1843, p. 62; *Thes.* n. 125, p. 135, t. 30, f. 240, 242; *Pfr. Ic.* n. 135, p. 130, t. 15, f. 23, 24, t. 16, f. 4.

*Cyclostoma fibulum*, *Jay, Catal.* 1850, p. 255, n. 5864.

*Leptopoma fibula*, *Pfr. in Z. f. M.* 1847, p. 109, n. 15; *Consp.* n. 164; *Gray, Cat. Cycl.* p. 26, n. 13; *Pfr. Pneum. Mon.* p. 113.

*Hab.* The Island of Luzon (H. Cuming).

## (1528) *Leptopoma goniostomum*.

Shell perforate, conoidal, thin, sculptured with several scarcely raised spiral lines, pellucid, pale horn-coloured, variously striped and spotted with brown; spire conical, rather pointed; whorls 6, scarcely convex, the last one sharply keeled, a little more convex on both sides; aperture diagonal, ovate, rather triangular, somewhat pearly inside; peristome thin, shortly expanded, with distant margins; right margin rather rectilinear; columellar margin shortly dilated, not covering the very narrow umbilicus; basal margin arcuate. Operculum flat, with the edge of the volutions slightly raised. Height  $13\frac{1}{2}$ , greatest breadth 17, least br. 15 mill.

*Cyclostoma goniostoma*, Sow. in *Proc. Z. S.* 1843, p. 64; *Thes.* n. 131, p. 137, t. 30, f. 233, 234; *Reeve, Conch. Syst.* t. 183, f. 3; *Pfr. Ic.* n. 10, p. 18, t. 2, f. 3-7, t. 16, f. 5.



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*Leptopoma goniostoma*, *Pfr. in Z. f. M.* 1847, p. 109, n. 16; *Consp.* n. 165; *Gray. Cat. Cycl.* p. 26, n. 14; *Pfr. Pneum. Mon.* p. 114.

*Hab.* Island of Mindanao, Cagayan, Province of Misamis (H. Cuming).

(1529) *Leptopoma pileus*.

Shell perforate, conical, thin, whitish, sometimes clouded with very pale-brownish; spire pyramidal, pointed; whorls 6, rather flat, the last one sharply keeled, moderately convex beneath; aperture very oblique, ovate, rather angular on the side of the keel; peristome shortly expanded, having a white internal callus, with distant margins; columellar margin slightly dilated, half covering the narrow umbilicus. Height 15, greatest breadth 15, least br.  $13\frac{1}{2}$  mill.

*Cyclostoma pileus*, *Sow. in Proc. Z. S.* 1843, p. 31; *Thes.* n. 128, p. 136, t. 29, f. 196, 197; *Pfr. Ic.* n. 9, p. 18, t. 2, f. 3, 4; *Desh. Traite elem. Conch.* t. 82, f. 9, 10.

*Leptopoma pileus*, *Pfr. in Z. f. M.* 1847, p. 109, n. 17; *Consp.* n. 166; *Gray. Cat. Cycl.* p. 26, n. 15; *Pfr. Pneum. Mon.* p. 114.

*Hab.* Island of Luzon, the province of Flocos (H. Cuming).

(1530) *Leptopoma atricapillum*.

Shell perforate, globose-pyramidal, thin, diaphanous, whitish, variously striped and speckled with dark brown; spire pyramidal, with the apex pointed, black; whorls 6, convex, marked with several more or less obsolete spiral ridges; last whorl slightly convex below the strongest keel, nearly smooth; aperture oblique, roundish, sublunate, shining and white inside; peristome thin, expanded, with distant margins; columellar margin slightly sinuate, scarcely dilated above, half covering the very narrow umbilicus. Height 11, greatest breadth  $12\frac{2}{3}$ , least br. 11 mill.

*Cyclostoma atricapillum*, *Sow. in Proc. Z. S.* 1843, p. 64; *Thes.* n. 130, p. 137, t. 30, f. 230, 231; *Pfr. Ic.* n. 12, p. 20, t. 2, f. 11, 12, t. 16, f. 6, 7.

*Leptopoma atricapillum*, *Pfr. in Z. f. M.* 1847, p. 109, n. 18; *Consp.* n. 167; *Gray. Cat. Cycl.* p. 26, n. 16; *Pfr. Pneum. Mon.* p. 115.

*Hab.* Island of Mindora, Calapan (H. Cuming).

(1531) *Leptopoma regulare*.

Shell very narrowly perforate, conically-globular, thin, sculptured with rather crowded spiral edges, which are equal above, very closely spirally striate in the interstices, diaphanous, whitish, regularly speckled with fulvous spots; spire turbinate, with the apex pointed, pale horn-coloured; whorls  $5\frac{1}{2}$ , moderately convex, the last one more rounded, inflat, and more obsoletely spirally striate below the peripheral ridge; aperture oblique, roundish, sublunate; peristome interrupted, thin, white, shortly expanded, with the columellar margin rather angularly dilated at its lower extremity. Height 10, greatest breadth  $12\frac{1}{2}$ , least br. 10 mill.

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*Cyclostoma regulare*, *Pfr. in Proc. Z. S.* 1851; *Ic.* n. 298, t. 40, f. 3, 4.

*Leptopoma regulare*, *Pfr. Consp.* n. 168, p. 58; *Pneum. Mon.* p. 116.

*Hab.* The Philippine Islands.

Nearly allied to *L. atricapillum*, from which it differs by shorter spire, regular ridges, narrower umbilicus, etc.

(1532) *Leptopoma acuminatum*.

Shell perforate, conical turreted, rather thin, obliquely slightly striate, diaphanous, shining, whitish; spire elongated, with the apex acuminate, brownish; whorls  $6\frac{1}{2}$ , moderately convex, last rounded, keeled below the middle; aperture very oblique, truncatedly ovate; peristome sharp, expanded, with distant margins; columellar margin rather dilated and slightly reflected above, rather angularly thickened at its lower extremity. Height 13, greatest breadth 12, least br. 10 mill.

*Cyclostoma acuminatum*, *Sow. in Proc. Z. S.* 1843, p. 65; *Thes.* n. 133, p. 138, t. 30, f. 235; *Pfr. Ic.* n. 104, p. 108, t. 13, f. 11, 12.

*Leptopoma acuminatum*, *Pfr. in Z. f. M.* 1847, p. 108, n. 1; *Consp.* n. 169; *Gray. Cat. Cycl.* p. 27, n. 18; *Pfr. Pneum. Mon.* p. 116.

*Hab.* Island of Luzon, S. Juan (H. Cuming).

(1533) *Leptopoma elatum*.

Shell conical, rather thin, obliquely striate, crossed, under a lens, with distant raised spiral lines, scarcely diaphanous, whitish; spire conical, rather pointed; whorls  $5\frac{1}{2}$ , somewhat convex, the last one more rounded, subacutely keeled, more closely decussated beneath; umbilicus extremely narrow, not pervious; aperture diagonal, truncatedly ovate; peristome simple, with the margins distant, equally broad, angularly expanded; columellar margin scarcely narrower. Height  $10\frac{1}{2}$ , greatest breadth  $11\frac{1}{2}$ , least br. 10 mill.

*Cyclostoma elatum*, *Pfr. in Proc. Z. S.* 1851; *Ic.* n. 226, t. 32, f. 16, 17.

*Leptopoma elatum*, *Pfr. Consp.* n. 170, p. 58; *Pneum. Mon.* p. 117.

*Hab.* Ceylon.

(1534) *Leptopoma tenebricosum*.

Shell narrowly umbilicate, globose-conical, slightly striate, thin, rather pellucid, brownish, varied with darker stripes and clouds; spire turbinate rather blunt; whorls 4, very convex, last rounded, with a narrow yellow band on the periphery; aperture somewhat oblique, nearly circular, blueish, shining inside; peristome simple, straight, interrupted, with the columellar margin slightly reflected. Height 12, greatest breadth 14, least br. 12 mill.

*Cyclostoma tenebricosum*, *A. Adams & Reeve, Voy. Samarang, Moll.* p. 67, t. 14, f. 6; *Pfr. Ic.* n. 232, t. 33, f. 12, 13.

*Leptopoma tenebricosum*, *Pfr. Consp.* n. 171; *Pneum. Mon.* p. 117.

*Hab.* Borneo, Balambangan.

(1535) *Leptopoma Birmanum*.

Shell perforate, globose-conic, thin, sharply keeled, obliquely striate, decussated with very indistinct spiral lines, little shining, diaphanous, brownish-yellow, painted with broad angular streaks and interrupted bands of chestnut-colour; spire turbinate, rather blunt; whorls  $4\frac{1}{2}$ , moderately convex, last ventricose beneath; aperture somewhat oblique, rather quadrangular blueish, pearly inside; peristome simple, sharp, with the margins distant, straight (or in the complete state reflected?) Height 10, greatest breadth  $14\frac{1}{2}$ , least br. 10 mill.

*Cyclostoma Birmanum*, *Pfr. Consp.* p. 58; *Ik.* n. 385, t. 47, f. 4-7.

*Leptopoma Birmanum*, *Pfr. Consp.* n. 172, *Pneum. Mon.* p. 117.

*Hab.* British Burmah (Th. Philippi).

(1536) *Leptopoma halophilum*.

Shell globose-conical, thin, slightly striate, rather shining, fulvous, usually with a narrow, chestnut-coloured band; spire conical, rather pointed; whorls 5, rounded, last not descending, umbilicus narrow, not pervious; aperture somewhat oblique, nearly circular; peristome simple, straight, shortly interrupted, with the columellar margin scarcely reflected. Height 4-6, greatest breadth 6-7, least br.  $4\frac{2}{3}$ -6 mill.

*Cyclostoma halophilum*, *Benson. in Ann. and Mag.* 2nd ser. vii. p. 265; *Pfr. Ik.* n. 220, t. 31, f. 29-31.

*Leptopoma halophilum*, *Pfr. Consp.* n. 173; *Pneum. Mon.* p. 118.

*Hab.* Ceylon, point de Galle (Benson), Colombo (Templeman).

*Leptopoma aspirans*, *Bens. Tenasserim Valley.* (2 sp.).

*Lomastoma (cylindracem). rec.* 19 sp. also fos.

*Megalomastoma. Guilding.*

23.\* *M. gravidum*, B.—Maulmein. Very common.

24. *M. sectilabre*, Gould.—Yanglaw, on the Tenasserim. Very rare.

(1537) *Megalomastoma croceum*.

Shell perforate, oblong-turreted, rather solid, slightly obliquely striate, diaphanous, saffron-coloured; spire turreted-conical, with the apex rather pointed; whorls 7-8, moderately convex, the last one forming about  $\frac{2}{3}$  of the whole length; pale anteriorly; aperture angularly ovate, proceeding with its base beyond the axis, similarly coloured inside; peristome double; inner edge continuous, slightly expanded, affixed; outer edge thickened, expanded, white, shortly interrupted on the penultimate whorls. Operculum? Length 31, breadth 13 mill.

*Cyclostoma croceum*, *Sow. Thes.* n. 167, p. 150, t. 29, f. 190, 191; *Pfr. Ik.* n. 177, p. 164, t. 24, f. 15, 16.

*Cyclostoma Gouldianum*, *Petit, Journ. Conch.* i. p. 45.

*Megalomastoma croceum*, *Pfr. in Z. f. M.* 1847, p. 109, n. 5; *Pneum. Mon.* p. 125.

*Farcimen croceum*, *Gray. Cat. Cycl.* p. 29, n. 2.

*Hab.* Island of Mauritius, Woods near Black River (Benson).

(1538) *Megalomastoma altum*.

Shell subperforate, oblong-turreted, rather solid, minutely striate, nearly smooth, silk-shining, chestnut-coloured; spire turreted, with the outlines curvilinear, with the apex rather pointed, yellowish; whorls 7-8, the upper ones scarcely convex, the penultimate more rounded, last whorl narrower, rounded beneath, with a blunt thread like keel; aperture rather oblique, produced with its base, circular, brown inside; peristome double; inner edge continuous, expanded, with a slightly-impressed channel on the left side near the columella; outer edge shortly expanded, dilated above and on the left side. Length 26; breadth 9, mill.

*Cyclostoma altum*, *Sow. in Proc. Z. S.* 1842, p. 84; *Thes.* n. 173, p. 152, t. 23, f. 187; *Pfr. Ik.* n. 131, p. 127, t. 15, f. 12-14.

*Megalomastoma altum*, *Pfr. in Z. f. M.* 1847, p. 109, n. 1; *Consp.* n. 194; *Gray. Cat. Cycl.* p. 31, n. 2; *Pfr. Pneum. Mon.* p. 132.

*Hab.* The Philippine Island of Negros (H. Cuning).

(1539) *Megalomastoma sectilabrum*.

Shell perforate, oblong-turreted, rather solid, very minutely striate, opaque, brown; spire turreted, with the apex rather blunt; whorls 7, convex, the last slightly receding below the penultimate, rounded, not thread-keeled beneath; aperture oblique, with the base produced beyond the axis, ovate, roundish; peristome double; inner edge expanded, affixed, slightly effuse on the columellar side, outer edge shortly expanded, slightly interrupted on the penult whorl, dilated above and below the perforation. Length 23, breadth 10 mill.

*Cyclostoma sectilabrum*, *Gould, in Bost. Journ.* 1844, p. 459, t. 24, f. 10; *Pfr. Ik.* n. 178, p. 164, t. 24, f. 17, 18, t. 47; f. 11, i. 12.

*Megalomastoma sectilabrum*, *Pfr. in Z. f. M.* 1847, p. 109, n. 6; *Consp.* n. 195; *Pneum. Mon.* p. 133.

*Farcimen sectilabrum*, *Gray. Cat. Cycl.* p. 29, n. 3.

*Hab.* British Burmah, Tavoy.

(1540) *Megalomastoma funiculatum*.

Shell shortly rimate, turreted-oblong, thin, striate and irregularly foveolate, rather pellucid, brown; spire elongate, with the apex rather blunt; whorls 7, moderately convex, the last forming about  $\frac{3}{4}$  of the whole length, furnished beneath with a cord-shaped keel; aperture nearly perpendicular, scarcely produced with its base, circular; peristome continuous, flesh-coloured,



# MOLLUSCA.

shortly affixed, expanded and reflected all round. Length  $22\frac{1}{2}$ , breadth  $8\frac{1}{2}$  mill.

*Cyclostoma funiculatum*, Benson, in *Journ. As. Soc.* vii. 1838, p. 217; *Sow. Thes. Suppl.* n. 195, p. 166\*, t. 31-B. f. 316, 317; *Pfr. Ic.* n. 219, t. 31, f. 27, 28.

*Megalomastoma funiculatum*, Gray, *Cat. Cycl.* p. 31, n. 3; *Pfr. Consp.* n. 196; *Pneum. Mon.* p. 133.

*Hab.* Darjiling, Sikkim-Himalayah.

## (1541) *Megalomastoma pauperculum*.

Shell small, cylindrically turreted, shining, of an olivaceo-fulvous colour; spire rather obtuse, with six slightly-rounded volutions, very finely striated with the lines of growth (sometimes rendered slightly rugulose by erosion); suture distinct, rather deep; aperture nearly circular; peristome slightly thickened, rounded, and reflected, very slightly foliaceous and interrupted at the last volution; umbilicus small, surrounded by a somewhat obsolete raised line. Length 18, breadth 8 mill.

*Cyclostoma pauperculum*, *Sow. Thes. Suppl.* n. 196, p. 166\*, t. 31 B. f. 318; *Pfr. Ic.* n. 412, t. 49, f. 37, 38.

*Megalomastoma pauperculum*, *Pfr. Consp.* n. 198; *Pneum. Mon.* p. 134.

*Hab.* Bhotan Sikkim-Himalayah (Benson).

*Megalomastoma gravidum*, Benson. Moulmein. *Cataulus*.

## (1542) *Cataulus tortuosus*.

Shell deeply rimate, fusiform-oblong, rather solid, very minutely striate, shining, whitish; spire ovate-turreted, with the apex rather pointed, whorls 7, convex, the two penultimate ones broad, last whorl more slender, detached, protracted downward, furnished beneath with a thread-shaped keel, which becomes broader near the aperture; aperture perpendicular, rather circular; peristome continuous, white, reflected, distinctly channelled at its base, angulated externally, sinuate on the right side. Length 18, breadth 6 mill.

*Turbo tortuosus*, Chemn. *Couch. Cab.* xi. p. 158. t. 195, f. 1882, 1893.

*Helix* (Cocholdina?) *tortuosa*, Feruss. *Prodr.* n. 504, p. 61.

*Pupa tortuosa*, Gray, in *Annals of Phil.* New ser. ix. p. 413.

*Urocoptis?* *tortuosa*, Beck. *Ind.* p. 83, n. 10.

*Cyclostoma tortuosum*, *Sow. Thes.* n. 172, p. 152, t. 23, f. 185, 186; *Pfr. Ic.* n. 179, p. 165, t. 24, f. 19, 20.

*Megalomastoma tortuosum*, *Pfr. in Z. f. M.* 1847, p. 109, n. 3; *Gray. Cat. Cycl.* p. 30, n. 1.

*Cataulus tortuosus*, *Pfr. Consp.* n. 200; *Pneum. Mon.* p. 136.

*Hab.* The Nicobar Islands.

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## (1543) *Cataulus Templemani*.

Shell subperforate, oblong, rather fusiform, solid, striate, slightly shining, chesnut-coloured; spire oblong-turreted, with the apex rather pointed; whorls 8, moderately convex, the last furnished beneath with a sharp prominent keel, deeply striate round the umbilicus, which is very narrow; aperture circular, with the base slightly produced; peristome continuous, orange-coloured, shortly affixed above; right and left margins expanded and reflected; basal margin dilated downward, furnished with a canal, which is linear internally, and becomes broader at its termination. Length 20, breadth  $7\frac{1}{2}$  mill.

*Pupina Templemani*, *Pfr. in Proc. Z. S.* 1851, *Ic.* t. 31, f. 15, 16.

*Cataulus Templemani*, *Pfr. Consp.* n. 201; *Pneum. Mon.* p. 136.

*Hab.* Ceylon (Templeton).

## (1544) *Cataulus Layardii*.

Shell subperforate, oblong, rather fusiform, solid, sculptured with distinct arcuate striæ, pale straw-coloured; spire oblong-turreted, with the apex rather pointed; whorls 8, nearly flat, the last furnished with a raised and compressed basal keel, radiately ribbed round the narrow umbilicus; aperture perpendicular, nearly circular, prolonged at its lower part by a rather open canal; peristome continuous, white, shortly affixed above, double; inner edge prominent; outer edge thickened and reflected, produced at its base, into an angle and grooved by a channel which is narrow internally, broader at the aperture. Length  $17\frac{1}{2}$ , breadth 7 mill.

*Megalomastoma Layardii*, Gray (*Brit. Mus.*), *Cat. Cycl.* p. 31, n. 4.

*Pupina Templemani*, *Pfr. in Proc. Z. S.* 1851.

*Pupina Layardii*, *Pfr. Ic.* t. 31, f. 17, 18.

*Cataulus Layardii*, *Pfr. Consp.* n. 202; *Pneum. Mon.* p. 137.

Brownish, with the suture obsoletely whitish-denticulate.

*Hab.* Ceylon (Mr. Layard).

## (1545) *Cataulus pyramidatus*.

Shell subperforate, ovate-pyramidal, solid, marked with distinct, crowded slightly arcuate striæ silk-shining, dark chestnut-coloured; spire turreted with apex rather pointed; whorls  $7\cdot7\frac{1}{2}$ , moderately convex, the last not lessened, scarcely produced beneath beyond the axis; basal keel compressed, scarcely dilated anteriorly; space between the keel and umbilicus rather broad, more deeply striate, turgid in the middle; aperture nearly circular; peristome white, continuous, shortly affixed, thickened, expanded horizontally and slightly reflected, scarcely produced at its lower part, and grooved by a middle-sized channel. Length 23, breadth 10 mill.

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*Cataulus pyramidatus*, *Pfr. in Proc. Z. S.* 1852,  *Ic. t. 48, f. 11; Pneum. Mon. p. 137.*

Larger, with the basal part of the peristome singularly produced; length 29, breadth  $12\frac{1}{2}$  mill. (*Pfr. Ic. t. 48, f. 9, 10.*)

*Hab.* Ceylon.

(1546) *Cataulus eurytrema*.

Shell subperforate, oblong, rather fusiform, solid with slightly arcuated striæ, scarcely shining, chesnut-coloured; spire turreted, with the apex rather blunt; whorls  $8\frac{1}{2}$ , convex, last narrower, with the base obliquely produced beyond the axis; basal keel strong, compressed, dilated gradually, like a tube, towards the peristome; aperture circular; peristome flesh coloured, continuous, shortly affixed, thickened and reflected with the left part of the basal margin grooved by a large canal, which is rather circular, and is produced inwards into a filiform crevice. Length 26, breadth 10 mill.

*Cataulus eurytrema*, *Pfr. in Proc. Z. S.* 1852,  *Ic. t. 48, f. 12, 13; Pneum. Mon. p. 138.*

*Hab.* Ceylon.

(1547) *Cataulus Thwaitesi*.

Shell scarcely perforate, turreted, rather fusiform, solid, sculptured with crowded small longitudinal ribs, scarcely shining, violaceous-brown; spire ovate-turreted, with the apex rather pointed; suture impressed; whorls 7-7 $\frac{1}{2}$ , moderately convex, last a little lessened; basal keel very strong, compressed, spreading angularly, white; aperture perpendicular, circular; peristome double, white; inner edge deeply grooved at its lower part; outer edge emarginated on the penult whorl, otherwise thickened and reflexed, perforated at its base by a middle sized channel. Length 19, breadth 7 mill.

*Cataulus Thwaitesi*, *Pfr. in Proc. Z. S.* 1852,  *Ic. t. 49, f. 9, 10, Pneum. Mon. p. 138.*

*Hab.* Ceylon, (Mr. Thwaites.)

(1548) *Alycæus gibbus*.

Shell irregularly conical, inflated, rather thin, sculptured with longitudinal rib-like striæ, flesh-coloured grayish; spire regularly elongate, conical, with the apex rather blunt, orange-coloured or blackish; suture deep, simple; whorls 6, very convex, the last one protuberantly inflated laterally, contracted near the aperture, narrower anteriorly; umbilicus excentric, very narrow, scarcely pervious; aperture oblique, nearly circular; peristome double; inner edge shortly produced; outer edge shortly expanded, emarginated near the perforation. Height 8, greatest breadth 11, least br. 8 mill.

*Cyclostoma gibbum*, *Ferussac, Mus.; Eydoux in Guerin, Mag.* 1838, t. 17, f. 1; *Sow. Thes. n.* 135, p. 139, t. 30, f. 247, 248; *Pfr. Ic. n.* 108, t. 46, f. 28.

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*Cyclophorus ? gibbus*, *Pfr. in Z. f. M.* 1847 p. 108; n. 21.

*Alycæus gibbus*, *Gray. Cat. Cycl. p. 28, n. 1; Pfr. Consp. n. 175; Pneum. Mon. p. 119.*

*Hab.* Cochin China; Touranne (Eydoux).

(1549) *Alycæus strungulatus*.

Shell depressed, rather discoidal, thin, sculptured with very minute rib like striæ, horn coloured whitish; spire scarcely raised, blunt; whorls 4, convex, the last one inflated laterally, narrower anteriorly, contracted near the aperture and furnished with a small reversed tube, which is incumbent on the suture; umbilicus wide, open; aperture oblique, circular; peristome simple, white, rather thickened and expanded, with the margins approximate, joined by callus. Height  $2\frac{1}{2}$ , greatest breadth  $4\frac{1}{2}$ , least br. 4 mill.

*Cyclostoma strangulatum*, *Hutton, MSS.; Pfr. in Z. f. M.* 1846, p. 86;  *Ic. n. 103, p. 104, t. 17, f. 7, 3. t. 38, f. 35.*

*Cyclophorus strangulatus*, *Pfr. in Z. f. M.* 1847, p. 108, n. 30.

*Alycæus strangulatus*, *Gray. Cat. Cycl. p. 28, n. 2; Pfr. Consp. n. 176; Pneum. Mon. p. 120.*

*Hab.* India. Landour.

(1550) *Alycæus constrictus*.

Shell perforate, ovate conic, smooth, with narrow, distant, oblique ribs, translucent, whitish or reddish brown; spire elongate conical, with the apex blunt; suture much impressed; whorls 4, rounded, the upper ones smooth, the following distantly ribbed, the last one sculptured with very crowded rib like striæ, strangulated behind the aperture, and broadly contracted anteriorly, with a retroversed sutural callus, like *L. strangulatum*, behind the constriction; aperture perpendicular, circular, equalling  $\frac{3}{4}$  of the whole length; peristome reflected all round. Operculum shelly, many whorled, with the suture inconspicuous. Height  $3\frac{1}{2}$ , breadth 2 mill.

*Cyclostoma constrictum*, *Benson. in Ann. and Mag.* 2nd. ser. xiii. 1851, p. 188, *Pfr. Ic. n.* 108, t. 46, f. 28.

*Alycæus constrictus*, *Pfr. Consp. n. 177, Pneum. Mon. p. 120.*

*Hab.* Darjiling Sikkim Himalayah.

*Alycæus pyramidalis*, B.—Therabuin hill, near the Tenasserim river. This pretty little shell appears confined to Therabuin hill, where it is not very common. It is of a delicate pink tint.

*Alycæus amphora*, B.—Maulmein and Tenasserim valley. Rare.

*Alycæus umbonalis*, B.—Akowtong. Not rare.

*Alycæus sculptilis*, B.—Thaïet-mio. Rare.

*Alycæus armillatus*, B.—Thaïet-mio. Rare.

*Alycæus prosectus*, B.—Teria Ghat. (vide March annals).



Tabular view of the distribution of the  
Cyclostomidae in Birmah and the  
Tenasserim Provinces.

	Ava.	Thaet-mio.	Akowitz.	Bangoon.	Maulmein.	Tenasserim valley
<i>Cyclophorus cornu venatorium</i> , Sav. ...	*		*			
* " <i>cryptomphalus</i> B. ...	*		*			*
* " <i>fulguratus</i> Pfr. ...	*		*			*
* " <i>calyx</i> , B. ...		*			*	
* " <i>Theobaldianus</i> , B. ...		*			*	
* " <i>Haughtoni</i> , mihi, ...		*			*	
* " <i>affinis</i> , mihi, ...		*			*	
* " <i>senra</i> , B. ...						*
* " <i>balteatus</i> P. ...						*
* " <i>aurantiacus</i> , Schurr. ...						*
* " <i>expansus</i> , Pfr. ...						*
* " <i>scissimargo</i> , B. ...			*			*
* <i>Alyceus sculptilis</i> , B. ...		*			*	*
* " <i>annulatus</i> , B. ...		*			*	*
* " <i>umbonalis</i> , B. ...		*			*	*
* " <i>amphora</i> , B. ...		*			*	*
* " <i>pyramidalis</i> , B. ...	*				*	*
* <i>Hydrocena frustillum</i> , B. ...					*	*
* " <i>pyxis</i> , B. ...					*	*
* " <i>illex</i> B. ...					*	*
* <i>Rhaphaulus crysalis</i> , Pfr. ...					*	*
* <i>Megalomastoma gravidum</i> B. ...					*	*
* " <i>sectilabre</i> Gould, ...					*	*
* <i>Pupina artata</i> B. ...			*		*	*
* " <i>arula</i> B. ...			*		*	*
* " <i>Pterocyclos pullatus</i> B. ...			*		*	*
* " <i>cetra</i> , B. ...			*		*	*
* " <i>Leptopoma aspirans</i> B. ...			*		*	*
* " <i>Otopoma blennus</i> B. ...			*		*	*

*Diplommata* (folliculus) rec. 8 sp

(1551) *Diplommata* ? *Sowerbyi*.

Shell subimperforate, ovate-oblong, very thin, smooth, shining, yellowish-glassy; spire ovate, with the apex blunt; whorls 5, inflated, the upper ones slightly ribbed, the penultimate broadest; aperture vertical, nearly circular; peristome white, shortly expanded, with the margins almost contiguous; columellar margin angularly dilated in the middle. Operculum? Length  $5\frac{3}{4}$ , breadth  $3\frac{1}{2}$  mill.

*Cyclostoma minus*, Sow. in *Proc. Z. S.* 1843, p. 65; *Thes.* n. 175, p. 150, t. 30, f. 249 (magnified); *Pfr. Ic.* n. 101, p. 103, t. 17, f. 9-11.

*Diplommata* ? *minus*, Gray, *Cat. Cycl.* p. 35 n. 3.

*Diplommata* ? *minor*, *Pfr. Consp.* n. 178.

*Diplommata* ? *Sowerbyi*, *Pfr. Pneum. Mon.* p. 121.

*Hab.* Philippine Islands of Panay and Zebu (H. Cuming.)

(1552) *Diplommata folliculus*.

Shell shortly rimate, acuminate ovate, obliquely distinctly ribbed, pale brownish-white; spire conical, rather pointed; whorls 7, convex, the last one narrower, subascendant anteriorly, scarcely forming  $\frac{1}{8}$  of the whole length; aperture rather perpendicular, nearly circular; peristome double; outer edge shortly expanded, with the margins approximate, joined by callus; right margin arcuate; columellar margin dilated, expanded. Length  $3\frac{1}{2}$ , breadth 2 mill.

*Carychium costatum*, Hutton, MSS.

*Bulimus folliculus*, *Pfr. Symb. Hist.* iii. p. 83; *Monogr. Helic.* ii. p. 81, n. 208; *Reeve, Conch.* ii. n. 644, t. 87.

*Diplommata folliculus*, Benson, in *Ann. and Mag.* 1849, Sept. p. 193; *Gray, Cat. Cycl.* p. 54, n. 1; *Pfr. Consp.* n. 179; *Ic.* t. 48, f. 32, 33; *Pneum. Mon.* p. 122.

*Hab.* India; Simla, near Sutlej (Hutton) Landour (Boys).

(1553) *Diplommata costulata*.

Shell imperforate, cylindric-ovate, whitish, very minutely ribbed, with the ribs oblique, regular, approximate; spire ovate-conical, rather blunt; whorls 3, the upper ones enlarging rapidly, last narrow, rather ascending anteriorly; suture deep; aperture nearly perpendicular, rather circular; peristome thin, almost continued, expanded, double; outer edge reflected, distinct from the ribs. Length 2, breadth scarcely 1 mill.

*Carychium costulatum*, Hutton, MSS.

*Carychium parvulum*, Boys, MSS. in *Brit. Mus.*

*Diplommata costulata*, Bens. in *Ann. and Mag.* 1849, Sept. p. 194; *Pfr. Consp.* n. 180; *Ic.* t. 48, f. 34-35; *Pneum. Mon.* p. 122.

*Diplommata costulatum*, Gray, *Cat. Cycl.* p. 55, n. 2.

*Hab.* India Western Himalayah (Benson) Landour (Boys).

(1554) *Diplommata Huttoni*.

Shell sinistral, rimate, ovate-conical, thin with very minute rib-like striae, silk-shining, fulvid, whitish; spire rather turreted, with the apex pointed; whorls  $5\frac{1}{2}$  convex, the last one narrower; aperture rather oblique, depressedly circular; peristome nearly continued, double; inner edge very short, with an obsolete callus tooth on the columellar; outer edge shortly expanded. Length  $2\frac{1}{2}$ , breadth 1 mill.

*Diplommata Huttoni*, *Pfr. in Proc. Z. S.* 1851; *Consp.* n. 181; *Ic.* t. 49, f. 36, 37; *Pneum. Mon.* p. 123.

*Hab.* India, Muporee.

*Diplommata diplocheilus* B. *Teria Ghat. J. Natural (Hist.)* (3 sp).

*Pupina*, rec. 8 sp.

(1555) *Pupinella pupiniformis*.

Shell open, perforate, oblong, regularly and crowdedly striate under a lens, brown; spire gradually tapering towards the rather pointed apex; whorls 7, moderately convex, the last shorter and narrower than the penultimate one; columella divided by an oblique, linear groove, which terminates externally into an open hole; aperture perpendicular, nearly circular; peristome broadly expanded and reflected, with the margins joined by a very thin callus; columellar margin flat, expanded, thickened round the hole and produced into a rounded keel, which sur-

rounds the umbilicus. Length 17, breadth  $6\frac{1}{2}$  mill.

*Cyclostoma pupiniforme*, Sow. in *Proc. Z. S.* 1842, p. 84; *Thes.* n. 174, p. 152, t. 28, f. 188.

*Pupina Sowerbyi*, *Pfr.* in *Z. f. M.* 1847, p. 110, n. 10; *Id.* p. 200, t. 27, f. 7, 8.

*Pupinella pupiniformis*, Gray. *Cat. Cycl.* p. 34; *Pfr. Consp.* n. 203; *Pneum. Mon.* p. 139.

*Hab.* Island of Luzon, the province of Cagayan (H. Cuming)

(1556) *Pupina Forbesi*.

Shell deeply and shortly rimate, pupa-shaped, solid, foveolate and wrinkled, opaque, fulvous-flesh-coloured; spire turgid in the middle, with the apex conoidal, rather blunt; whorls 6, the upper four convex, regular, the fifth flattened on the side of the mouth, the last much narrower, descending anteriorly, ascending near the aperture with the arcuate keel near the umbilical cleft; aperture nearly circular, with the base produced beyond the axis; peristome thick, fulvous-orange-coloured, reflected, with two channels; one very small at the insertion of the right margin, the second very deep and surrounded with thick callus between the arcuate body-margin and the left margin. Length 30, breadth 15 mill.

*Pupina grandis*, Forbes in *Voy. Rattlesnake*, *App.* p. 380, t. 2, f. 10, not Gray.

*Pupina Forbesi*, *Pfr. Consp.* n. 204; *Id.* t. 31, f. 19, 20; *Pneum. Mon.* p. 140.

*Hab.* The Louisiade Archipelago (Macgillivray).

(1557) *Pupina humilis*.

Shell scarcely subperforate, oblong-ovate, solid, little shining, pale brownish; whorls 6, the upper ones moderately convex, the last rounded, slender; aperture perpendicular, circular, with two channels; peristome thickened, expanded, with the right margin produced upwards, separated from the arcuate body-margin by a small sinus; columellar margin divided in the middle by a channel which runs backward arcuately, and is surrounded by thick callus. Length 16, breadth 7 mill.

*Pupina humilis*, Jacq. in *Ann. Sc. Nat.* 1841. *Hombr. & Jacq. Voy. Pol. Sud. Moll.* t. 10, f. 21-24; Sow. in *Proc. Z. S.* 1841, p. 103; *Thes.* n. 7, p. 18, t. 4, f. 2; Reeve, *Conch. Syst.* t. 181, f. 7, 8; *Pfr. Id.* p. 204, t. 27; f. 15, 16; Gray, *Cat. Cycl.* p. 33, n. 3; *Pfr. Consp.* n. 205; *Pneum. Mon.* p. 140.

*Pupina antiquata*, Sow. *Conch. Mon.* ed. ii. t. 526.

*Hab.* New Guinea. (Hombr. and Jacq.)

(1558) *Pupina Mindorensis*.

Shell imperforate, pupa-shaped, rather solid, very closely striate, silk-shining, brown; spire oblong-conical, with the apex rather pointed; suture deep, bordered; whorls 7, convex, the last one narrower, rounded; aperture rather circular, oblique, its base being produced beyond

the axis, sinuated above by a triangular callus, which is placed on the body of the penultimate whorl, near the insertion at the right margin; peristome broad, thickened, angularly reflected, with the right margin suddenly lessened near the upper channel; columellar margin flat, truncated in a right angle, forming an open channel, which is dilated backward. Length 11, breadth 5, mill.

*Pupina Mindorensis*, A. Adams & Reeve, *Voy. Samarang. Moll.* p. 57, t. 14, f. 2; *Pfr. Id.* t. 31, f. 21, 22; *Consp.* n. 206; *Pneum. Mon.* p. 141.

*Hab.* The southern part of Mindoro (Belcher).

(1559) *Pupina bilinguis*.

Shell oblong ovate, pellucid, shining, horn-coloured; spire tapering gradually towards the apex, which is rather blunt; suture impressed, scarcely callus; whorls 6, the upper three convex, closely striate, the following ones rather flat, smooth, the last forming a little more than one-third of the whole length; aperture perpendicular, rather circular, with two open ascending channels; upper channel formed by a strong, triangular, tongue-shaped lamina near the insertion of the right margin; peristome rather thickened, shortly expanded, with the columellar margin flat, tongue-shaped, sharp, forming the second channel with the basal margin. Length 10 breadth 5 mill.

*Pupina bilinguis*, *Pfr.* in *Proc. Z. S.* 1850, p. 97; *Consp.* n. 207; Forbes, in *Voy. Rattlesnake*, *App.* p. 374; *Pfr. Pneum. Mon.* p. 142.

*Hab.* The north-east coast of Australia, Cape York (Macgillivray); Blackwood Bay and Restoration Island.

(1560) *Pupina Thomsoni*.

Shell imperforate, pupa-shaped, extremely thin, smooth, pellucid, pale reddish horn-coloured; spire ovate-conical, with the apex rather blunt; suture not callus; whorls 6, the upper ones convex, the penultimate rather flat, the last narrow; aperture nearly circular, with two channels produced at its base beyond the axis; peristome slightly thickened, with the body-margin terminated on the right side into a tongue-shaped appendix, separated by a narrow equal sinus from the right margin, which is sinuate; columellar margin truncated, forming with the basal margin a channel, which is bordered by two callus bands diverging upwards. Length  $8\frac{1}{2}$ , breadth 4 mill.

*Pupina Thomsoni*, Forbes, in *Voy. Rattlesnake*, *App.* p. 381, t. 3, f. 2; *Pfr. Pneum. Mon.* p. 142.

*Hab.* Fitzroy Island, north-east coast of Australia (Macgillivray).

(1561) *Pupina bicanaliculata*.

Shell ovate-acuminate, rather thin, pellucid, smooth, shining, fulvous, or glassy; whorls 6, the last shorter than the spire, descending regularly; suture distinct impressed; aperture nearly



# MOLLUSCA.

perpendicular, circular, with two channels, the upper of which is formed by a small raised lamina on the body of the penultimate whorl near the insertion of the right margin; columella very narrowly carved obliquely; peristome simple, with the right margin indistinctly thickened. Length  $6\frac{1}{2}$ , breadth 4 mill.

*Pupina bicanaliculata*, Sow. in *Proc. Z. S.* 1841, p. 103; *Thes.* n. 9, p. 19, t. 4, f. 1; *Pfr. Ic.* p. 204, t. 27, f. 19, 20; *Gray. Cat. Cycl.* p. 33, n. 1; *Pfr. Consp.* n. 202; *Pneum. Mon.* p. 143.

*Hab.* The Philippine Islands of Zebu (H. Cuming.)

## (1562) *Pupina Keraudreni*.

Shell pupa-shaped, diaphanous, smooth, very shining, yellowish-white; apex rather blunt; whorls 5, the last shorter than the spire, descending obliquely; suture callous; aperture perpendicular, circular, with a slight upper channel formed by minute lamina on the body of the penultimate whorl, columella carved horizontally; peristome simple, blunt. Length  $6\frac{1}{2}$ , breadth  $3\frac{1}{4}$  mill.

*Pupina Keraudreni*, Vignard, in *Ann. Sc. Nat.* iii. p. 440, t. 11; Sow. in *Proc. Z. S.* 1841, p. 103; *Thes.* n. 8, p. 19, t. 4, f. 3; *Pfr. Ic.* p. 206, t. 27, f. 23, 24; *Gray, Catal. Cycl.* p. 33, n. 4; *Pfr. Consp.* n. 210; *Pneum. Mon.* p. 143.

*Pupina mitis*, Hinds, in *Ann. and Mag.* x. p. 83, t. 6, f. 7.

*Hab.* New Guinea (Vignard); New Ireland (Hinds); and Salomon Islands.

## (1563) *Pupina*. Vignard.

26.\* *P. arula*, B.—Yanglaw, very rare. Among dead leaves.

27.\* *P. artata*, B.—Maulmein. Not uncommon, among dead leaves and rubbish at the foot of rocks. By the habitat "Maulmein" the "Farm caves" in limestone hills a few miles distant are intended

Tabular view of the distribution of various Burmese Helicidae.

	Ava.	Thajet-mio.	Akwatong.	Rangoon.	Maulmein	Tenasserim valley.
* <i>Hypselostoma tubiferum</i> , B. ....	*					
<i>Streptaxis Petiti</i> , Gould, ....					*	*
<i>Cryptosoma præstans</i> , Gould, ....					*	*
<i>Succinea semiserica</i> , Gould, ....					*	*
" (ined), ....					*	*
<i>Bulimus atricallosus</i> , Gould, ....					*	*
" <i>Janus</i> , Pfr. ....					*	*
* " <i>Theobaldianus</i> , B. ....					*	*
* " <i>putus</i> , B. ....				*		
" <i>insularis</i> , Ehr. ....	*	*	*	*		
" <i>gracilis</i> , H. ....	*	*	*	*		
<i>Achatina tenuispira</i> , B. ....		*	*	p	p	*
<i>Pupa bicolor</i> , H. (mellita, Gould), ....		*	*			*
<i>Clausilia insignis</i> , Gould, ....						*
" <i>Philippiana</i> , Gould, ....						*

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Total Cyclostomidae, Genera, ..... 9  
Species, ..... 31

..... 31

Helicidae Genera, ..... 10

Species, ..... 60

60

Auriculidae, Genera, ..... 2

Species, ..... 3

3

Grand Total, ..... 94

June 8th, 1857.

Sub-genus. *Rhegostoma* (nunezii). rec. 6 sp.

## (1564) *Registoma grande*.

Shell ovate-cylindrical, smooth, very shining, rather diaphanous, sulphur or lemon-yellow, or reddish; apex blunt; whorls 5, convex, the last one shorter than the spire, deviating, rather flattened, bordered anteriorly with chestnut-colour; suture impressed, rather simple; aperture parallel with the oblique axis, rather angularly circular; Columellar dilated, flat, with an oblique notch, forming on the edge a small open hole, and externally a slightly prominent ridge; peristome broadly expanded, blunt. Length  $11\frac{1}{2}$ , breadth  $7\frac{1}{2}$  mill.

*Pupina grandis*, Gray, in *Aun. Nat. Hist.* 1840, vi. p. 77.

*Puqa aurantia*, Grateloup, in *Act. Soc. Linn. Bord.* xi. p. 166.

*Moulinsia Nunezii*, Grateloup, *ibid.* p. 429, t. 8, f. 22, 23.

*Pupina Nunezii*, Sow. in *Proc. Z. S.* 1841, p. 101; *Reeve, Conch. Syst.* t. 181, f. 5, 6; Sow. *Thes.* n. 1, p. 17, t. 4, f. 8-11; *Pfr. Ic.* p. 201, t. 27, f. 1-6; *Desh. Traite. elem.* t. 82, f. 17; 18.

*Pupina Nunezii*, Sow. *Conch. Mon.* ed. ii. f. 527.

*Registoma Grande*, Gray. *Catal. Cycl.* p. 32, n. 1; *Pfr. Consp.* n. 211; *Pneum. Mon.* p. 145.

*Hab.* The Philippine Island of Luzon, Samar Catanduanos, Siquijor, Leyte (H. Cuming).

## (1565) *Registoma pellucidum*.

Shell obliquely-ovate, very smooth, pellucid, fulvous; apex blunt; whorls  $5\frac{1}{2}$ , the upper ones depressed, the penultimate prominent, the last shorter than the spire, deviating, shortly ascending anteriorly; suture rather simple; columella flattened, curved backward, perforated by a channel, which is nearly covered and ends in an open hole; aperture parallel to the axis rather circular; peristome slightly thickened, shortly expanded. Length  $7\frac{1}{2}$ , breadth 5 mill.

*Pupina pellucida*, Sow. in *Proc. Z. S.* 1841, p. 102; *Thes.* n. 2, p. 17, t. 4, f. 18-20; *Pfr. Ic.* n. 202, t. 27, f. 17, 18.

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*Registoma pellucidum*, Gray, *Cat. Cycl.* p. 32, n. 2; *Pfr. Consp.* n. 212; *Pneum. Mon.* p. 145.

*Hab.* The Philippine Islands of Luzon and Zebu (H. Cuming).

(1566) *Registoma simile*.

Shell ovate, rather elongate, smooth, shining, pellucid, pale fulvous; apex rather pointed; whorls 6, nearly flat, the last forming scarcely one-third of the whole length; suture linear, rather simple; columella thickened, vaulted, separated from the peristome by an oblique deep notch, terminating in an open hole, which is conspicuous on the back of the shell; aperture nearly circular, with its base slightly protracted, circular; peristome thickened, expanded, yellowish-white. Length 11, breadth  $5\frac{1}{2}$  mill.

*Pupina similis*, Sow. in *Proc. Z. S.* 1841, p. 102; *Thes.* n. 5, p. 18, t. 4, f. 4, 5; *Reeve, Conch. Syst.* t. 181, f. 3, 4; *Pfr. Ic.* p. 202, t. 27, f. 13, 14.

*Registoma simile*, Gray, *Cat. Cycl.* p. 32, n. 3; *Pfr. Consp.* n. 238; *Pneum. Mon.* p. 146.

*Hab.* Bolino, Island of Luzon, province of Zambales (H. Cuming).

(1567) *Registoma fuscum*.

Shell ovate-acuminate, highly polished, shining, pellucid, brownish-fulvous; whorls  $6\frac{1}{2}$ -7, convex, the last narrower than the penultimate, not equalling one-third of the total length; suture simple, slightly callus; columella short, rather convex, terminated by a rather horizontal notch, which ends in a triangular hole, not conspicuous on the back of the shell; aperture large, circular, nearly perpendicular; peristome dilated, flattened expanded, orange coloured or yellow, with the basal margin strongly arcuate. Length 11, breadth  $5\frac{1}{2}$  mill.

*Pupina fusca*, Gray, in *Ann. of Nat. Hist.* vi. 1840, p. 77.

*Pupina vitrea*, Sow. in *Proc. Z. S.* 1841, p. 102; *Thes.* n. 4, p. 10, t. 4, f. 6, 7; *Conch. Mon.* ed. ii. f. 524; *Reeve Conch. Syst.* t. 181, f. 1, 2; *Pfr. Ic.* p. 203, t. 27, f. 9-12; *Desh. Traite elem. Conch.* t. 82, f. 19, 20.

*Registoma vitreum*, Hasselt *Ally. k. en letter b.* 1823.

*Registoma fuscum*, Gray, *Cat. Cycl.* p. 32, n. 4; *Pfr. Consp.* n. 214; *Pneum. Mon.* p. 146.

*Hab.* Luzon and Mindanao (H. Cuming).

(1568) *Registoma Nicobaricum*.

Shell imperforate, ovate-conical, rather solid, highly-polished, shining, pale reddish-yellow; spire convex, conical above, with the apex rather pointed; suture linear; whorls 5, scarcely convex, the last one descending obliquely, shortly, ascending near the aperture, rounded beneath; aperture nearly perpendicular, circular, marked with a minute callus knot near the insertion of the right margin; peristome simple, scarcely expanded; columellar margin slightly thickened, separated from the basal margin by a short rather ascending notch. Length 6, breadth 3 mill.

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*Pupina Nicobarica* (*Registoma*), *Pfr. in Proc. Z. S.* 1852; *Ic. t.* 48 f. 23-31; *Pneum. Mon.* p. 147.

*Hab.* The Nicobar Islands.

(1569) *Callia lubrica*.

Shell ovate-acuminate, smooth, shining, pellucid, fulvous glassy; whorls 5, moderately convex, the last much shorter than the spire, ascending anteriorly; suture impressed, callus; aperture nearly circular, with the base slightly produced beyond the axis; columella, short vaulted, altogether covering the perforation, forming a blunt angle, without any notch with the peristome, which is blunt and slightly expanded. Length 9, breadth  $5\frac{1}{2}$  mill.

*Pupina lubrica*, Sow. in *Proc. Z. S.* 1841, p. 102; *Thes.* n. 3, p. 18; t. 4, f. 12, 13; *Conch. Mon.* ed. ii. p. 90, f. 528, *Reeve. Conch. Syst.* t. 181, f. 9, 10

*Callia lubrica*, *Pfr. in Z. f. M.* 1847, p. 110; *Ic.* p. 207, t. 21, f. 30-33; *Gray. Cat. Cycl.* p. 34, n. 1, *Pfr. Consp.* n. 216, *Pneum. Mon.* p. 148.

Larger; length 11, breadth 6, mill. (*Pfr. Ic.* t. 27, f. 28, 29)

Smaller; length 7, breadth 6 mill. Sow. *Thes.* t. 4, f. 4, f. 14, 15; *Pfr. Ic.* t. 27, f. 25-27.)

*Hab.* The Philippine Islands of Luzon Panay Siquijor (H. Cuming).

(1570) *Licina evoluta*.

Shell oblong-turreted, truncate, rather thin, very minutely and closely decussated by spiral and longitudinal lines, scarcely shining, ash-gray, clouded with fulvous, and conspersed with reddish-brown points, which are arranged into indistinct bands; spire convexly conical; suture rather channelled; whorls remaining 4, moderately convex, the last one rounded, detached anteriorly, slightly descending, more distinctly spirally furrowed beneath; umbilicus not pervious; aperture perpendicular, roundish-ovate, brownish inside; peristome free, continuous, rather simple, expanded, with the columellar margin narrower. Operc.—? Length 36, breadth 20 mill.

Lister, *Hist. Conch.* t. 25, f. 23.

*Cyclostoma evolutum*, *Reeve, Conch. Syst.* p. 99, t. 185, f. 18, *Pfr. Ic.* n. 330, t. 9, f. 20, t. 42, f. 4; *Desh. Traite elem. Conch.* t. 82, f. 5, 6.

*Cyclostoma subasperum*, Sow. *Thes.* n. 143, p. 142, t. 28, f. 159.

*Cistula decussata*, *Humphr. MSS.*

*Licina evoluta*, Gray, *Cat. Cycl.* p. 61, n. 2; *Pfr. Consp.* n. 221; *Pneum. Mon.* p. 152.

*Hab.* East India?

*Helicina. Syn. Oligyra. Pachytoma. Ampullina. Pitonillus. rec.* 150 sp.

(1571) *Helicina margaritacea*.

Shell globular, glassy, fragile, yellowish whitish, very pellucid; spire moderately convex; aperture semicircular; peristome very thin, simple.



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with the columellar margin rather impressed. Height  $1\frac{1}{2}$ , breadth 2". (Lesson.)

*Helicina margaritacea*. Lesson. *Voy. de la Coquille*, p. 350; *Pfr. Pneum. Mon.* p. 353.

*Hab.* New Guinea.

(1572) *Helicina citrina*.

Shell rather depressed, thin, faintly striated, shining, diaphanous, lemon-yellow; spire short, somewhat conoidal; whorls 5, rather flat, increasing rapidly, the last one more or less depressed and slightly angulated, more convex beneath; aperture scarcely oblique, broadly semioval; columella short, arcuate, truncated at its lower extremity, forming an angle with the peristome, which is simple and narrowly expanded. Operculum shelly externally, purplish internally, with an elevated white rib. Height 10, greatest breadth 16, least br. 13, mill.

*Helicina citrina*, Grateloup, in *Act. Soc. Linn. Bord.* xi. p. 413, t. 3, f. 15; *Pfr. Ic.* n. 57, p. 45, t. 3, f. 4-9, t. 7, f. 1, 2; *Pneum. Mon.* p. 379.

*Helicina polita*, Sow. in *Proc. Z. S.* 1842, p. 7; *Thes.* n. 33, p. 8, t. 2, f. 76-81; *Reeve. Conch. Syst.* t. 186, f. 9.

Smaller; uniformly yellow, or with a white band along the suture; height 6, greatest breadth  $8\frac{1}{2}$ , least br. 7 mill.

*Hab.* The Philippine Islands, Luzon, Mindanao, Zebu (H. Cuming).

(1573) *Helicina sublaevigata*.

Shell conoidally-depressed, rather solid, nearly smooth, slightly shining, uniformly reddish, or whitish, with a violaceous band beneath; spire shortly conoidal, with the apex rather blunt; whorls 5, scarcely convex, last broader, indistinctly angular on the periphery; aperture diagonal, rather semioval; columella short, simple, dilated backwards into a rather thick, circumscript callus; peristome simple, shortly expanded, with the basal margin nearly rectilinear, somewhat toothed at its junction with the columella. Operculum thin, horny. Height 5, greatest breadth 8, least br.  $6\frac{1}{2}$  mill.

*Helicina sublaevigata*, *Pfr. in. Proc. Z. S.* 1852; *Pneum. Mon.* p. 384.

*Hab.* The New Hebrides Islands.

(1574) *Helicina lutea*.

Shell orbiculate, convex, solid, thick, minutely striated above, gold-yellow; spire somewhat elevated, last whorls globose, slightly keeled on the periphery; aperture oblique, semicircular, shining and white within; columella white, sinuate; peristome simple, free. Height 3, breadth 5". (Less.)

*Helicina lutea*, Less. *Voy. Coquille*, p. 350, t. 13, f. 10; *Pfr. Pneum. Mon.* p. 387.

*Hab.* Port Dorey, New Guinea.

(1575) *Helicina Lindeni*.

Shell globose-conic, rather thin, very minutely striated and punctured, rather diaphanous, pale

## MOLLUSCA.

yellow or flesh-coloured; spire conic, rather pointed; whorls 6, scarcely convex, last inflated; obsolete angulated, not descending anteriorly; aperture somewhat oblique, semioval, higher than broad; columella slightly arcuate, terminating outward in a small tooth, dilated backwards into a small, thin callus; peristome narrowly expanded and somewhat reflected. Height  $8\frac{1}{2}$ , greatest breadth  $11\frac{1}{2}$ , least br. 10 mill.

*Helicina Lindeni*, *Pfr. in Proc. Z. S.* 1848, p. 123; *Ic.* n. 67, p. 52, t. 8, f. 22, 23; *Pneum. Mon.* p. 388.

*Hab.* Tapinapa, Mexico (Linden).

(1576) *Helicina agglutinans*.

Shell depressed-conic, rather thin, closely striated, yellow; spire broadly conic, pointed; whorls 5, rather flat, last keeled, scarcely descending anteriorly, flattened beneath; aperture very oblique, rather quadrangular; columella short, slightly holed, terminating outward angularly, dilated into a thin callus; peristome thin, with the upper margin scarcely expanded, basal margin narrow reflected; keel of young specimens winged with agglutinated decomposed particles of rocks. Operculum shelly, trapezoidally semioval. Height  $9\frac{1}{2}$ , greatest breadth 17, least br. 15 mill.

*Helicina agglutinans*, Sow. in *Proc. Z. S.* 1842, p. 7; *Thes.* n. 52, p. 11, t. 2, f. 8385; *Reeve. Conch. Syst.* ii. t. 186, f. 11, 12; *Pfr. Ic.* n. 75, p. 56, t. 2, f. 16-18; *Pneum. Mon.* p. 394.

*Hab.* The Philippine Islands of Guimaras, Bohol Pany (H. Cuming).

(1577) *Helicina pallida*.

Shell lenticular, rather solid, yellowish-gray, striated inequally, covered with a very thin periostraca; spire depressed; whorls 5, keeled, flattened; aperture semilunate, callus near the columella; labrum moderately reflected. Height  $\frac{3}{8}$ , breadth  $\frac{1}{10}$  inch. (Gould)

*Helicina pallida*, Gould, in *Proc. Bost. Soc.* 1847, p. 202; *Exped. Shells*, p. 37, ed. 1851, p. 96, f. 113; *Pfr. Pneum. Mon.* p. 296.

*Hab.* Feejee Islands.

(1578) *Helicina Lazarus*.

Shell depressed-conic, rather solid, coarsely striated and granulated, opaque, lemon-yellow; spire elevated, rather pointed; whorls  $5\frac{1}{2}$ , nearly flat, last keeled, equally moderately convex on both sides, scarcely descending anteriorly; aperture very oblique, almost triangular; columella extremely short, angularly terminating outward, sending backwards an arcuated line, which surrounds the thin basal callus; peristome simple, thin, scarcely expanded. Height 5, greatest breadth  $9\frac{3}{4}$ , least br.  $8\frac{1}{2}$  mill.

*Helicina Lazarus*, Sow. in *Proc. Z. S.* 1842, p. 7; *Thes.* n. 53, p. 11, t. 2, f. 91; *Pfr. Ic.* n. 78, p. 53, t. 7, f. 18, 19; *Pneum. Mon.* p. 396.

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*Hab.* The island of Luzon (H. Cuming)

(1579) *Helicina trochiformis*.

Shell, trochiform, soiled, faintly striated obliquely, opaque, pale straw-yellow; spire conic, pointed; whorls  $4\frac{1}{2}$ , flat, sharply and somewhat prominently keeled, last nearly flat beneath, descending anteriorly; aperture very oblique, nearly triangular; columella short, simple; peristome thin, with both margins expanded, scarcely angulated on the right side. Height 5, greatest breadth 8, least br. 7 mill.

*Helicina trochiformis*, Sow. in *Proc. Z. S.* 1842, p. 7; *Thes.* n. 49, p. 10, t. 2, f. 90; *Pfr. Ic.* n. 79, p. 59, t. 2, f. 12, 13; *Pneum. Mon.* p. 397.

*Hab.* The Philippine island of Negros (H. Cuming).

(1580) *Helicina tæniata*.

Shell nearly discoidal, faintly striated, yellowish-white, with a single red band; spire slightly raised, conoidal; whorls  $4\frac{1}{2}$ , last very large, strongly keeled, very convex beneath; aperture semilunate rather ovate; peristome simple, white, very, slightly reflexed; columella depressed, terminating in a small tooth. Breadth  $4\frac{1}{2}$ . (Quoy)

*Helicina tæniata*, Quoy & Gaim. *Voy. Astrol. Zool.* ii. p. 194, t. 12, f. 6-10; *Desh. in Lam. Hist.* viii. p. 159, n. 7; Sow. *Thes.* t. 2, f. 49, 51; *Pfr. Ic.* n. 85a, p. 63 (i. 19), t. A. f. 14 (from Quoy); *Pneum. Mon.* p. 398.

Smaller; rather globular, with two or three red bands (Quoy & Gaim. t. 11, f. 34-38).

*Hab.* The island of Vanikoro, the variety from Tonga.

(1581) *Helicina Stanleyi*.

Shell lenticular, convex above and beneath, orbicular, sharply keeled, fuscous-flesh-coloured, striated spirally; spire blunt; whorls  $4\frac{1}{2}$ , moderately convex, last imperforated beneath, smooth and white on the centre; aperture obliquely sub-lunate, angulated; peristome simple, thin. Height 5, greatest breadth  $6\frac{1}{2}$ , least br. 6 mill. (Forb.)

*Helicina Stanleyi*, Forbes, in *Voy. Rattlesnake*, *App.* p. 381, t. 3, f. 4; *Pfr. Pneum. Mon.* p. 401.

*Hab.* Duchateau Isles, Louisiade Archipelago (Macgillivray).

(1582) *Helicina Nicobarica*.

Shell lenticular, rather thin, smooth, slightly shining, whitish or horn-coloured, painted usually with one or two narrow red bands; spire short, blunt; whorls 4, nearly flat, enlarging gradually, last sharply keeled, more convex beneath, marked sometimes with indistinct raised spiral lines; aperture somewhat oblique, obtusely triangular; columella short, with an indistinct knot; peristome sharp, expanded very narrowly; basal callus shining, surrounded with a whitish line. Operculum thin, flesh-coloured. Height  $3\frac{1}{2}$ , greatest breadth  $5\frac{1}{2}$ , least br. 5 mill.

*Helicina Nicobarica*, Philippi in *Z. f. M.* 1847, p. 149; *Pfr. Ic.* n. 85, p. 52, t. 2, f. 19-21; *Pneum. Mon.* p. 402.

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*Hab.* The Nicobar Islands (Th. Philippi).

*Stoastoma. rec.* 19 sp.

(1583) *Stoastoma succineum*.

Shell umbilicate, globose-conic, thin, smooth, pellucid, amber-coloured; spire conic, rather pointed; whorls 6, moderately convex, the last one excavate beneath; umbilicus narrow, open; aperture somewhat oblique, semioval; peristome simple, sharp, furnished at the base of the columellar margin with a small callus tongue, which is horizontally produced into the umbilical keel. Operculum typical. Height 4, greatest breadth  $4\frac{1}{2}$ , least br.  $3\frac{1}{4}$  mill.

*Cyclostoma succineum*, Sow. in *Proc. Z. S.* 1832, p. 32 (*Mull. Synops.* p. 87); *Thes.* n. 51, p. 108, t. 23, f. 18, 19; *Pfr. Ic.* n. 15, p. 24, t. 3, f. 12-14.

*Cyclostoma australe*, Muhlf. *MSS. in Anton. Verz.* p. 54, n. 1946.

Cyclophorus? *succineus*, *Pfr. in Z. f. M.* 1847, p. 108, n. 22.

*Stoastoma succineum*, *Pfr. in Z. f. M.* 1849, p. 115, 1850, p. 59; *Pneum. Mon.* p. 319.

*Electrina succinea*, Gray, *Catal. Cycloph.* p. 30, n. 1.

*Hab.* The Polynesian island Opara (H. Cuming).

### Family VII. Aciculidæ.

Genera. *Acicula. rec.* 5 sp. *Geomelania. rec.* 21 sp.

(1584) *Acicula striata*.

Shell elongate, turreted, cylindrical, truncate, fulvous, strongly furrowed longitudinally; whorls 6-7, rather oblique; aperture nearly oval; peristome thick, not reflected; operculum oval, few-whorled, thin, pale, Length 3''' (Quoy.)

*Cyclostoma striata*, Quoy & Gaim. *Voy. Astrol. Zool.* ii. p. 186, t. 12, f. 27-30.

*Truncatella Quoyi*, *Pfr. in Z. f. M.* 1846, p. 187.

*Acicula striata*, Gray, *Catal. Cycloph.* p. 68, n. 3, *Pfr. Pneum. Mon.* p. 6.

*Hab.* The Island of Vanikoro.

### Order III. Opistho-branchiata.

#### Section A. Tecti-branchiata.

##### Family I. Tornatellidæ.

Genera. *Tornatella. Syn. Actæon. Dactylus.* ? *Monoptygma. rec.* 16 sp. *fossil*, 70 sp.

*Tornatella flammea*.

*Tornatella selidula*.

##### Family II. Bullidæ.

Genus. *Bulla*. Bubble-shell. *Syn. Haminea* (hydatis), *rec.* 50 sp. *fossil*, 70 sp.

*Bulla naucum*.

*Bulla ampulla*.

*Bulla ovum*.

*Bulla valva*.

*Bulla birostris*.

*Bulla verrucosa*.

Amboyna.

Japan.

China.

Amboyna.



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<i>Bulla naucum.</i>	Amboyna.
<i>Bulla ampulla.</i>	Amboyna.
<i>Bulla soluta.</i>	Ceylon.
<i>Bulla physis.</i>	East Indies.
<i>Bulla amplus tre.</i>	China.
<i>Bulla velum.</i>	Tranquebar.
<i>Bulla scabra.</i>	Java.
<i>Bulla ficus.</i>	Amboyna.
<i>Bulla rapa.</i>	China.
<i>Bulla terebellum.</i>	Amboyna.
<i>Bulla fasciata.</i>	East and West Indies.
<i>Bulla achatina.</i>	East Indies.
<i>Bulla cylindrica.</i>	South Sea.

*Sub genera.* ? *Crypt-ophthalmus* (smaragdinus). *rec.*

*Phaneroptalmus* (Xanthonella). *rec.*

*Accra.* *rec.* 7 sp.

*Cylichna.* *rec.* 20 sp. *fossil.*

*Amphisphyræ.* *rec.* 5 sp. *Syn.* *Utriculus Rhizorus.* *Diaphana.*

*Aplustrum.* *Syn.* *Bullina.* *Hydatina.* *Bullinula.* *rec.* 10 sp.

*Bullæa.* *rec.* 10 sp. also *fossil.*

*Sub-genus* *Chelidonura.* *rec.*

Family III. *Aplysiadæ.*

Genera. *Aplysia* Sea Hare. *rec.* 40 sp. also *fossil.*

*Dolabella.* *rec.* 12 sp.

*Notarchus.* *rec.* 4 sp.

Family IV. *Pleurobranchidæ.*

Genera. *Pleurobranchus.* *Syn.* *Berthella* *Oscanius.* *rec.* 20 sp.

*Umbrella.* Chinese-umbrella shell. *Syn.* *Acardo.*

*Gastroplox.* *rec.* 3 sp. *fossil* 2 sp.

Family V. *Phyllidiadæ.*

Genera. *Phyllidia.* *rec.* 4 sp.

Section B. *Nudibranchiata.*

Family VI. *Doridæ.* Sea-Lemons.

Genera. *Doris.* *recent.*

*Goniodoris.* *rec.* 2 sp.

*Polycera.* *rec.* 5 sp.

*Ceratostoma.* *rec.*

Family VII. *Tritoniadæ.*

? *Bornella.* *rec.* 2 sp. Sanda, Borneo.

? *Melibœa.* *rec.* off the Cape.

Family VIII. *Æolidæ.*

Genera. *Eubranchius.*

*Amphorina.*

*Glaucus.* *Syn.* *Laniogerus.* *Pleuropus.* *rec.* 6 sp.

*Alderia.* *rec.* Red Sea.

*Stiliger* (ornatus). *recent* Red Sea.

Family IX. *Phyllirhoidæ.*

Genus. *Phyllirhoe.* *Syn.* *Eurydice.* *rec.* 6 sp.

Family X. *Elysiadæ.*

Genera. *Elysia.* *Syn.* *Actæon.* *rec.* *Elysia ocellates* Rang.

## ORDER IV. NUCLEOBRANCHIATA.

Family I. *Firolidæ.*

Genera. *Firola.* *Syn.* *Pterotrachæa.* *rec.* 8 sp.

*Carinaria.* *rec.* 5 sp. *fossil* 1 sp.

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### CLASS III. PTEROPODA.

Section A. *Thecosomata.*

Family I. *Hyalcidæ.*

Genera *Hyalea.* *Syn.* *Cavolina.* *rec.* 19 sp. *fossil* 5 sp.

*Cleodora.* *Syn.* *Clio.* *rec.* 12 sp. also *fossil.*

*Sub-genus.* *Creseis.* *rec.* 5 sp.

*Cuvieria.* *rec.* 4 sp. *fossil.* 1 sp.

*Sub genus* *Eurybia.* *rec.* 3 sp.

*Sub-genus.* *Psyche.* *rec.* 1 sp.

*Cymbulia.* *rec.* 3 sp.

\* *Tiedemannia.* *rec.* 2 sp.

Family II. *Limacinidæ.*

Genera. *Limacina.* *Syn.* *Spiratella.* *rec.* 2 sp.

*Spiralis.* *Syn.* *Heterofusus.* *rec.* 12 sp.

*Cheletropis.* *Syn.* *Sinusigera.* *rec.* 12 sp.

*Macgillivrayia.* *rec.* 2 sp.

Section B. *Gymnosomata.*

Family III. *Clidæ.*

Genera. *Clio.* *Syn.* *Clione.* *rec.* 4 sp.

*Sub-genus.* ? *Clidita.* *rec.* 3 sp.

*Pneumodermon.* *rec.* 4 sp.

*Sub genus.* ? *Spongiobranchæa.* *rec.* 2 sp.

? *Pelagia.* *rec.*

*Cymodocea.* *rec.* 1 sp.

### CLASS IV. BRACHIOPODA.

Family I. *Terebratulidæ.*

Genera. *Terebratula.* Lamp-shell, *rec.* 1 sp. *fossil.* 100 sp.

*Syn.* *Lampas.* *Gryphus.* *Epithyris.*

*Sub-genera.* *Terebratulina.* *rec.* 7 sp. *fossil.* 20 sp.

(1585) *Terebratulina Japonica.*

Shell oblong, thin, whitish, radiately striated; striae numerous, bifurcating; sides rather flattened near the hinge; beak truncated by a moderate, incomplete, very oblique foramen; deltidium obsolete; loop small, anelliform. Lon. 13, lat. 9 lines.

*Terebratula Japonica.* G. B. Sowerby. *Thes. Conch.* vii. 344. t. 68. f. 7, 8.

*Adams & Reeve. Zool. Samarang.* p. 71. pl. 21. f. 1 ?

*Hab.* Japan. (Muss. Cuming.)

(1586) *Terebratulina angusta.*

Shell elongate-oval, slightly compressed, pellucid white, closely and very finely costellated longitudinally; ribs rough; beak truncated: valves nearly equal, slightly furrowed in the middle; front margin a little sinuated. Lon. 11, lat. 7 lines.

*Terebratulina angusta.* Adams. & Reeve. 1850 *Zool. Samarang.* p. 71. pl. 21. f. 2.

*Terebratulina caput-serpentis.* var ?

*Hab.* Seas of Japan.

(1587) *Terebratulina abyssicola.*

Shell oval-elongated, tapering to the beak and a little truncated in front, pale flesh-colour, radiated with obscure, bifurcating striae; beak produced; foramen moderate, entire; dorsal

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valve with a slight central depression. Lon. 8, lat. 7 lines.

*Terebratula abyssicola*, Adams & Reeve, 1850 *Zool. Samarang.* p. 72, pl. 21, f. 5.

*Terebratulina abyssicola*, Dav. May 1852, *Ann. Nat. Hist.* p. 366.

*Hab.* Cape of Good Hope; at 120 fathoms.

(1588) *Terebratulina Cumingii*.

Shell minute, somewhat pentagonal, gibbous, yellowish white, ornamented with very numerous minute, elevated, radiating and intercalating striae: valves with very small ears; beak small, obliquely truncated by a round, incomplete foramen; deltidia separate; margins slightly sinuated in front; loop anelliform. Lon.  $3\frac{1}{2}$ , lat. 3, alt. 2 lines.

*Terebratulina Cumingii*, Dav. May 1852, *Ann. Nat. Hist.* p. 366; *Proc. Zool. Soc.* p. pl. f. 17-19.

*Hab.* Chinese Seas. (Mus. Cuming.)

*Waldheimia (australis)*. rec. 9 sp. fossil. 60 sp.

(1589) *Waldheimia picta*.

Shell ovate, rather narrowed in front and at the beak, smooth, thin, orange-red, ornamented with irregular pale rays; margins even; beak recurved; foramen small entire; deltidia narrow united; loop elongated, recurved. Lon. 12, lat. 10 alt. 2 lines.

*Anomia picta*. Chemnitz. *Conch. C.* xi. 247. t. 203. f. 2011. 2012.

*Anomia cranium*, var. Dillw. *R. S.* 295.

*Terebratula picta*, Sow. *Thes. Conch.* vii. 351, t. 70. f. 43. 44.

Var. *Terebratula rubella* G. B. Sow. *Thes. Conch.* vii. 350. t. 69. f. 40-42.

*Hab.* Java.

(1590) *Waldheimia Grayii*.

Shell suborbicular, ornamented with numerous radiating ribs; ribs unequal, bifurcating and intercalating; colour reddish yellow, becoming deep red at the lines of growth; dorsal valve rather flat; ventral valve convex; beak obtuse with distinct lateral ridges; foramen very large, incomplete; deltidia disunited; loop elongated, reflected. Lon. 14, lat. 15, alt. 9 lines.

*Terebratula Grayii*, Davidson, May 1852, *Ann. Nat. Hist.* p. 365; *Zool. Proc.* 1852, p. pl. f. 1-3.

*Hab.* Korea.

*Eudesia (cardium)*. rec. 1 sp. fossil, 6 sp.

*Terebratella*. rec. excluding sub-genera 16 sp. fossil 16 sp.

(1591) *Terebratella Coreanica*.

Shell quadrangular, smooth, pale brown with crimson rays; beak obtuse, with lateral ridges; hinge-area large; foramen large, complete; deltidia united; dorsal valve flattish; loop elongated, doubly attached. Lon. 13, lat.  $13\frac{1}{2}$  lines.

*Terebratula Coreanica* Adams & Reeve, 1850, *Zool. Samarang.* p. 71. pl. 21, f. 3.

*Terebratella Coreanica*. Dav. 1852. *Ann. Nat. Hist.* p. 367.

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*Hab.* Corean Archipelago.

(1592) *Terebratella rubella*.

Shell oval, pointed at the beak and truncated in front, smooth, red-yellow, with diverging rays of bright red; dorsal valve with a slight central depression in front; beak recurved; hinge-area narrow; foramen small; deltidia large, united; loop elongated, doubly attached. Lon. 10, lat. 8, alt. 5 lines.

*Terebratula rubella*, G. Sowerby, 1846, *Thes. Conch.* vii. p. 350, pl. 59. f. 10-12.

*Terebratula rubella*, Dav. *Ann. Nat. Hist.* 1852.

*Hab.* Japan. (Mus. Norris, Cuming)

(1593) *Terebratella sanguinea*.

Shell suborbicular, slightly notched in front, pale yellowish, with bright red, spotted rays; margins slightly sinuated in front; dorsal valve rather depressed in front; beak short, rather pointed, with well-defined lateral ridges; perforation moderate, complete; deltidia rather large, united; area broad and well defined; loop elongated, doubly attached. Lon. 5, lat.  $5\frac{1}{2}$ , alt. 2 lines.

*Anomia sanguinea*, Chemnitz, *Conch. Cab.* viii. p. 96 t. 78. f. 706.

Dillwyn, *R. S.* p. 293, 1817.

*Anomia sanguinolenta*, Gmelin, *S. N.* p. 3847.

*Terebratula sanguinea*, Sow. *Thes. Conch.* vii. d. 357. t. 71. f. 71, 73.

*Anomia cruenta*, Solander M. S. in Mus. Banks

*Terebratula cruenta*, Donovan, *Nat. Repos.* t. 56. f. 1.

*Terebratula erythroleuca*, Quoy & Gaim. *Voy. Astrol.* iii. p. 55 t. 85. f. 8, 9.

Desh. in Lamk. *Hist.* ed. 2 vii. p. 350.

*Terebratella sanguinea*. Dav. *Ann. Nat. Hist.* 1852, p. 368.

*Hab.* Philippines, attached to coral.

Sub-genera. *Magas (pumila)*. rec. 1 sp. fossil 2 sp.

*Bouchardia (tulipa)*. rec.

*Morrissia*. rec. 2 sp. fossil 1 sp.

*Kraussia (rubra)*. rec. 6 sp.

? *Megerlia*. rec. 2 sp.

(1594) *Megerlia pulchella*.

Shell oval, pointed at the beak, smooth, whitish, with a few radiating red lines; margins rather flexuous; foramen large, incomplete; deltidia small, separate; area indistinct; dorsal valve flattened; loop small, trebly attached. Lon. 3, lat. 2, alt. 1 line.

*Terebratula pulchella*, G. Sowerby, *Thes. Conch.* vii. p. 360. pl. 71. f. 105-107.

*Megerlia pulchella*, Dav. *Ann. Nat. Hist.* 1852, p. 369.

*Hab.* Philippines. Coros Island.

? *Waltonia (Valenciennei)* rec.

*Argiope*. *Syn. Megathyris*, rec. 4 sp. fossil 5 sp.

*Thecidium*. rec. 1 sp. fossil 27 sp.

Family III. Rhynchonellidae.

Genera. *Rhynchonella*. *Syn. Hypothyris*. *Hemithyris*, *Acanthothyris*. *Cyclothy-*



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ris. *Trigonella*. *rec.* 2 sp. *fossil* 250 sp.

Family VI. *Craniadae*.

Genus. *Crania* *Syn.* *Criopus*. *Orbicula*, *rec.* 5 sp. *fossil* 28 sp.

Family VIII. *Lingulidae*.

Genera. *Lingula*. *rec.* 7 sp. *fossil* 34 sp.

## CLASS V. CONCHIFERA.

Section A. *Asiphonida*. without respiratory siphons.

Family I. *Ostreidae*

Genera. *Ostrea*. *Syn.* *Amphidonta* and *Pycnodonta* *Peloris*, *rec.* 60 sp. *fossil* 200 sp.

<i>Ostrea striatula</i> .	Indian Ocean.
<i>Ostrea minuta</i> .	Indian Ocean.
<i>Ostrea pleuronectes</i> .	Amboyna.
<i>Ostrea japonica</i> .	Japan.
<i>Ostrea radula</i> .	Amboyna.
<i>Ostrea plica</i> .	Amboyna.
<i>Ostrea pallium</i> .	India.
<i>Ostrea senatoria</i> .	Moluccas.
<i>Ostrea citrina</i> .	India.
<i>Ostrea oblitterata</i> .	Moluccas.
<i>Ostrea pusio</i> .	Nicobar Islands.
<i>Ostrea tranquebarica</i> .	East India.
<i>Ostrea turgida</i> .	East Indies.
<i>Ostrea sulcata</i> .	Malabar.
<i>Ostrea flavicans</i> .	Southern Ocean.
<i>Ostrea fragilis</i> .	Nicobar Islands.
<i>Ostrea malleus</i> .	Amboyna.
<i>Ostrea anatina</i> .	Nicobar Islands.
<i>Ostrea orientalis</i> .	East Indies.
<i>Ostrea folium</i> .	Amboyna.
<i>Ostrea sinensis</i> .	China.
<i>Ostrea orbicularis</i> .	East Indies.
<i>Ostrea arborea</i> .	East Indies.
<i>Ostrea denticulata</i> .	Cape of Good Hope.
<i>Ostrea edulis</i> .	Ocean.
<i>Ostrea spondyloidea</i> .	Indian Seas.
<i>Ostrea isognomon</i> .	Amboyna.
<i>Ostrea ephippium</i> .	Tranquebar.
<i>Ostrea legumen</i> .	Nicobar Islands.
<i>Ostrea vulsella</i> .	Amboyna.
<i>Ostrea asperima</i> .	South Sea.
<i>Ostrea muscosa</i> .	South Sea.
<i>Ostrea ornata</i> .	Tranquebar.
<i>Ostrea imbricata</i> .	
<i>Ostrea folium</i> .	
<i>Ostrea crista galli</i> .	

*Sub-genera.* *Gryphaea*. *fossil* 30 sp.

*Exogyra* (*conica*). *fossil* 40 sp.

*Anomia*. *Syn.* *Fenestrella*. *Cepa*. *Aenigma* *rec.* 20 sp. *fossil* 30 sp.

<i>Anomia cranis laris</i> .	Philippine Islands.
<i>Anomia capensis</i> .	Cape of Good Hope.
<i>Anomia sanguinolenta</i> .	East Indies.
<i>Anomia cruenta</i> .	Southern Seas.
<i>Anomia prota</i> .	Tranquebar.
<i>Anomia sella</i> .	Amboyna.
<i>Anomia rubra</i> .	East Indies.
<i>Anomia ephippium</i> and two others.	Singapore.

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*Sub-genera.* *Placunomia*. *Syn.* *Pododesmus*, *rec.* 12 sp.

*Placuna*. Window-shell, *rec.* 4

*Placuna placenta*.

The kinds most abundant in Singapore, are as follows—*Placuna placenta*, *Strombus incisus*, *S. labiosus*, several species of *Nassa*, *Columbella*, *Trochus*, *Cerithium*, *Mitra*, *Turritella*, *Dentalium*, *Aspergillum*, *Arca*, *Venus*, *Corbula*, *Tellina* and others.

*Pecten*. *Syn.* *Argus*. *Discites*. *Amusium*, *rec.* 120 sp. *fossil* 450 sp.

*Pecten pleuronectes*.

*Pecten sinuosus*.

*Pecten rostellum*.

*Pecten flavidulus*

*Pecten varius* and two others.

*Pecten*. *Chickulcoody*. North of Pulicat.

*Pecten singaporinus*.

*Pecten histrioides*. Ceylon.

*Lima*. *Syn.* *Plagiostoma* *rec.*

*Lima squamosa*. Singapore.

*Lima inflata*.

*Lima fragilis*.

*Lima linguatula*.

*Sub-genera* *Limatula*. *rec.* 8 sp. also *fossil*.

*Limæa*. *rec.* 20 sp. *fossil* 200 sp.

*Spondylus*. Thorny-oyster. *Syn.* *Dianchora*.

*Podopsis*. *Pachytes*, *rec.* 30 sp. *fossil* 45 sp.

*Spondylus gaedarpus*.

*Spondylus regius*. Amboyna India.

*Sub-genus* *Pedum*. *recent*.

*Plicatula*. *rec.* 6 sp. *fossil* 40 sp.

*Plicatula dipressa*.

*Plicatula ramosa*.

Family II. *Aviculidae*.

Genera, *Avicula*, *rec.* 25 sp. *fossil* 300 sp.

*Sub-genera.* *Meleagrina*. Pearl-oyster, *rec.* 3 varieties.

In several of the shallow bays of Singapore an abundance of a small species of *Meleagrina* or Mother of Pearl Oyster, few of the shells are larger than the palm of the hand, and of a dark slate colour. Those accustomed to trade in Mother of Pearl, that this kind never attains a large size. Dr. Traill was at first inclined to doubt the accuracy of the statement, as I do not find more than two described species, namely, the *M. margaritifera*, and *M. albina* which is also to be found here. What leads to the supposition of its being a distinct species is that the large kind has never been picked up here.

*Malleus*. Hammer-oyster, *rec.* 6. sp.

*Malleus vulgaris*.

*Malleus albus*.

*Malleus vulsellatus*.

*Malleus nonalis*.

*Vulsella lingulata*.

*Vulsella* *Syn.* *Renicella*, *rec.* 3 sp. *fossil* 4 sp.

*Perna* *Syn.* *Melina*. *Isognomon*. *Pedalion*, *rec.* 16 sp. *fossil* 30 sp.

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*Perna vulsella.*  
*Perna ehippium.*  
*Perna femoralis.*

*Sub-genera.* *Crenatula*, *rec.* 5 sp.

*Pinna*, *rec.* 30 sp. *fossil* 50 sp.

*Pinna inflata.* Nicobar Islands  
*Pinna muricata.* East Indies.  
*Pinna vexillum.* Indian Seas.  
*Pinna incurva.* Amboyna.  
*Pinna vitera.* Indian Seas.  
*Pinna papyracea.* Indian Seas.  
*Pinna digitiformis.* Indian Ocean.  
*Pinna labala.* Indian Ocean.

*Pinna.*

*Pinna pectinata.*

*Pinna flabellum.*

*Pinna squamosa* and  
*others.*

*Sub-genus.* *Trichites*, *fossil* 5 sp.

Family III. *Mytilidæ*. Mussels.

Genera. *Mytilus*. Sea-mussel, *rec.* 50 sp. *fossil* 80 sp.

*Mytilus.* Malacca.  
*Mytilus hyotis.* Amboyna.  
*Mytilus margaritiferus.* Amboyna.  
*Mytilus radiatus.* Tranquebar.  
*Mytilus lithopagus.* East and West Indies.  
*Mytilus coralliophagus.* East and West Indies.  
*Mytilus fuseus.* East Indies.  
*Mytilus plicatus.* Nicobar Islands.  
*Mytilus niveus.* Nicobar Islands.  
*Mytilus bilocularis.* Indian Ocean.  
*Mytilus exustus.* Tranquebar.  
*Mytilus smaragdinus.* Tranquebar.  
*Mytilus ruber.* Southern Ocean.  
*Mytilus ala corvi.* South Sea Islands.  
*Mytilus lingua.* Amboyna.  
*Mytilus camellii.* Japan.  
*Mytilus castaneus.* China.  
*Mytilus bilocularis.* Singapore.  
*Mytilus perna.* Singapore.

*Modiola.* Horse-mussel, *rec.* 50 sp. *fossil* 130 sp.

*Modiola.* Ceylon.

*Modiola.* Malacca.

*Modiola.* Madras.

*Sub-genera.* *Lithodomus*, *rec.* 12 sp. *fossil* 16 sp.

*Lithodomus.* Malacca.

*Lithodomus malayanus.*

*Crenella*, *recent* and *fossil*.

*Modiolarea*, *rec.*

? *Mytilimeria*, *rec.*

*Dreissena*, *Syn.* *Mytilomya*. *Congerina*. *Tichogonia*, *fossil* 10 sp.

*Dreissena.* Labuan.

Family IV. *Arcadæ*.

Genera. *Arca*, *rec.* 130 sp. *fossil* 200 sp.

*Arca tortuosa.* Amboyna.  
*Arca volucris.* Malacca.  
*Arca fusca.* Singapore.  
*Arca disparilis.* Malacca.

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*Arca granosa.* Malacca.  
*Arca antiquata.* Malacca.  
*Arca lacerata.* East Indies.  
*Arca cucullus.* Nicobar Islands.  
*Arca granosa.* Tranquebar.  
*Arca rhomboidea.* East Indies.  
*Arca indica.* Coromandel.  
*Arca corbicula.* Cape of Good Hope.  
*Arca reticulata.* West Indies.  
*Arca pellucida.* Nicobar Islands.  
*Arca decussata.* East and West Indies.

*Arca semitorta.*

*Arca tetragona.*

*Arca navicularis.*

*Arca barbata.*

*Arca cancellaria.*

*Arca granosa* and five others.

*Cucullæa*, *rec.* 1 sp. *fossil* 100 sp.

*Pectunculus*, *rec.* 50 sp. *fossil* 70 sp.

*Limopsis*, *rec.* 1 sp. *fossil* 17 sp.

*Nucula*, *rec.* 70 sp. *fossil* 100 sp.

*Leda*, *Syn.* *Lembulus*, *rec.* 30 sp. *fossil* 110 sp.

*Sub-genus.* *Yoldia*, *rec.* also *fossil*.

*Solemya*, *Syn.* *Malletia*. *Ctenoconcha*. *Neilo*, *rec.* 2 sp. *fossil* 1 sp.

? *Solemya*, *Syn.* *Solenomya*, *rec.* 4 sp. *fossil* 4 sp.

Family V. *Trigoniadæ*.

Genera. *Trigonia*, *Syn.* *Lyriodon*, *rec.* 3 sp. *fossil* 100 sp.

Family VI. *Unionidæ*. Naides.

Genera. *Unio*. River-mussel. *rec.* 250 sp. *fossil* 50 sp.

*Unio marginalis.* Ceylon.  
*Unio cæruleus.* Calcutta.  
*Unio cæruleus*, young. Calcutta.  
*Unio marginalis.* Calcutta.  
*Unio.* Ceylon.  
*Unio.* Tenasserim.  
*Unio.* Tenasserim.  
*Unio*, from *Wye* near Mahabaleshwar.  
*Unio*, undescribed. Malacca.  
*Unio.* Tenasserim.  
*Unio favidens.* Calcutta.  
*Unio grayii.* China.  
*Unio.* Irawadi.

*Sub-genera.* *Monocondylæa*, *rec.* 6 sp.

*Hyria*, *rec.* 4 sp.

*Castalia*, *Syn.* *Tetraplodon*, *re.*

*Anodon*. Swan-mussel, *rec.* 50 sp. *fossil*, 5 sp.

*Iridina*, *Syn.* *Mutela*. *Spatha*, *rec.* 6 sp.

*Mycetopus*, *rec.* 3 sp.

*Ætheria*, *rec.*

*Mulleria*, *Syn.* *Acostæa* (*Guaduasana*), *rec.*

Section B. *Siphonida*. with respiratory siphons.

a. *Siphons* short, *pallial* line simple.

Family VII. *Chamidæ*.

Genera. *Chama*, *Syn.* *Arcinella*, *rec.* 50 sp. *fossil* 30 sp.

*Chama gigas.* Amboyna.

*Chama hippopus.* Amboyna.



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<i>Chama moltkiana.</i>	China.
<i>Chama plumbea.</i>	South Sea.
<i>Chama semiorbiculata.</i>	Arabia.
<i>Chama calyculata.</i>	Indian Seas.
<i>Chama coralliophaga.</i>	East Indies.
<i>Chama lazarus.</i>	East Indies.
<i>Chama arcinella.</i>	East Indies.
<i>Chama C. lazarus</i> and two others.	

### Family IX Tridacnidae.

Genera. *Tridacna* clam-shell, *rec.* 6 sp. *fossil* 1 sp.

*Tridacna gigas.*

*Tridacna crocea.*

*Tridacna squamosa.*

*Sub-genus. Hippopus. rec.*

*Hippopus maculatus.*

*Hippopus*, from Trincomallee, in Ceylon.

### Family X. Cardiadae.

Genera. *Cardium. Cocle. Syn. Papyridea, rec.* 200 sp. *fossil* 270 sp.

*Cardium medium.* India and America.

*Cardium angulatum.* Ceylon.

*Cardium.* Ceylon.

*Cardium setosum, varie-*  
*ty?* Madras.

*Cardium multispinosum* China.

*Cardium fimbriatum.* Malacca.

*Cardium isocardia.* East and West Indies.

*Cardium citrinum.* India and South America

*Cardium auricula.* Arabia.

*Cardium Lima.* Indian Ocean.

*Cardium papyraceum.* Indian Ocean.

*Cardium apertum.* Asia and South America.

*Cardium Donaciforme.* Indian Ocean.

*Cardium Aloicum.* India and China.

*Cardium latum.* Indian Ocean.

*Cardium roseum.* Nicobar Island and Gulf  
of Bengal.

*Cardium hemicardium.* East Indies.

*Cardium Fragum.* Indian Seas.

*Cardium unedo.* Amboyna.

*Cardium retusum.* East Indies.

*Cardium Cardissa.* East Indies.

*Cardium humanum* Indian Ocean and Per-  
sian Gulf

*Cardium cardissa.* Singapore.

*Cardium hemicardium.* „

*Cardium papyraceum.* „

*Cardium unedo.* „

*Cardium flavum.* „

*Cardium exiguum.* „

*Cardium humanum.* „

*Cardium cliare* and ano-  
ther. „

*Cardium caliculata.* „

*Sub-genera. Adacna. rec.* 8 sp.

### Family XI. Lucinidae.

Genera. *Lucina rec* 70 sp *fossil* 200 sp.

*Sub-genus. Cryptodon. rec.* also *fossil*.

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*Corbis. Syn. Fimbria. Idotea, rec.* 20 sp. *fossil*, 80 sp.

*Diplodonta. Syn. Sphaerella, rec.* 12 sp. also *fossil*.

*Sub-genera. ? Scacchia. rec.* 2 sp. *fossil* 1. sp.

*Ungulina. rec* 4 sp.

*Kellia. Syn. Lasea. Cycladina. Bornia. Erycina*  
*rec.* 20 sp. *fossil* 20 sp.

*Sub-genera. Turtonia recent.*

*Pythina. rec.* 2 sp. also *fossil*.

*Montacuta. rec.* 3 sp. *fossil*. 2 sp.

*Lepton. Syn ? Solecardia (eburnea), rec.* 3 sp.  
also *fossil*.

*Galeomina. rec.* 3 sp. also *fossil*.

### Family XII. Cycladidae.

Genera. *Cyclas. Syn. Sphaerium. Pisum, Mus-*  
*culium, rec.* 30 sp. *fossil*, 35 sp.

(1595) *Sphaerium Indicum.*

S. testa ovato-rhomboidea, tumidula, sub-  
aequilaterali, tenui, pellucida, albo-grisea, la-  
tere antico late rotundato, postico obtuse trun-  
cato; umbonibus tumidis, parum prominentibus;  
cardine obsolete bidentato, dentibus laterali-  
bus candidis, antico majore trigono, acuto, postico  
paulo brevior; valvis sublente tenuissime striatis.

*Sphaerium Indicum, Desh. Proc. Zool. Soc.*  
1854.

*Hab.* In fluviis Indiae.

(1596) *Sphaerium Capense.*

S. testa ovato-orbiculari, tumida, subglobosa,  
tenui, cornea, aequilaterali, transversim tenuis-  
sime striata; extremitatibus rotundatis, postice  
obtusior; apicibus marginibusque obtusis;  
dentibus cardinalibus minimis, lateralibus val-  
vulae dextrae prominentibus, acutis.

*Cyclas Capensis, Krauss, Sudaf. Moll. p. 7.*  
No. 1. pl. 1. f. 5.

*Hab.* Caput Bonae Spei.

*Sub-genus. Pisidium, rec.*

*Cyrena. rec.* 25 sp. *fossil* 70 sp.

*Cyrena malaccensis. Malacca.*

*Cyrena. Moulmein.*

*Cyrena. Gurseppa Village on the Honawer River*  
*? Cyrenoides. Syn. Cyrenella, rec.* 1. sp.

(1597) *Cyrena triangularis.*

C. testa trigona, solidiuscula, epidermide fus-  
co-virescente, transversim striata, striis marginali-  
bus lateralibusque eminentioribus, sulco ab um-  
bone ad marginem posteriorem leviter impressa;  
margine antico descendente, vix excavato, angu-  
lo anteriore rotundato; margine superiore subro-  
tundato, postico fere biangulato; valvis intus  
lacteis, margine continuo nitentior; dentibus  
cardinalibus in utraque valva tribus, duobus  
bifidis; dentibus lateralibus brevibus, tenuissime  
rugosis haud stratis.

*Cyrena triangularis, Metcalfe. Proc. Zool. Soc.*  
1851, p. 74. no. 36.

*Hab.* Borneo.

(1598) *Cyrena turgida*.

C. testa trigona, inflata, parte antica turgida, rugoso, inaequilaterali, transversim rugata; valvulis crassis, natibus, elevatis, recurvis; dentibus cardinalibus sub-bifidis; dente anteriore laterali brevi et elevato, posteriore longo et laminato; margarita alba.

*Cyrena turgida*, *Lea. Trans. of Amer. Phil. Soc.* v. 109. pl. 18. f. 53, *Observ. on the Genus Unio*, i. 221. pl. 18. f. 53.

*Hanley, Descr. Cat.* i. 93; in *Wood, Ind. Test. Suppl.* 2, pl. 14. f. 50.

*Hab.* In fluviis Indiæ.

(1599) *Cyrena Sumatrensis*.

C. testa ovali, gibbosa, crassa, intus alba aut flavescens, extus fusco-virescente; dentibus cardinalibus tribus, duobus majoribus, angulatis, sub-bifidis, dentibus lateralibus brevibus, tenuissimis sine rugosis.

*Cyrena Sumatrensis*, *Sow. Gen. of Shells*, f. 1-4.

*Desh. Lamk. An. s. Vert.* ed. 2. vi. 277. no. 15.

*Reeve. Conch. Syst.* pl. 63

*Hanley, Descr. Cat.* p. 94; in *Wood, Ind. Test. Sup.* 2. pl. 15, f. 1.

*Hab.* In rivulis insulæ Sumatrensis.

(1600) *Cyrena Bengalensis*.

C. testa subcordata, trigona, inaequilaterali, tumidiuscula, crassa, solida, alba sub epidermide squalide fuscescenti, transversim irregulariter striata; latere antico valde declivi, planulato, posteriore dorsali parum convexo; margine inferiori vix arcuato; umbonibus erosione oblique incurvatis parum prominentibus; valvis intus albis, cardine incrassato oblique tridentato; dentibus subparallelis sensim crescentibus, duobus in valva dextrabifidis uno mediano in valva sinistra; antico minore, dentibus lateralibus maximis, brevibus, simplicibus; impressione pallii prope marginem inferiorem descendente; nymphis latis, depressis; ligamento angusto, brevi, partim immerso.

*Cyrena Bengalensis*, *Desh. Lam. An. s. Vert.* ed. 2. vi. 276. no. 10.

*Deless. Rec. de Coq.* pl. 7. f. 6. a.d.

*Hanley, Descr. Cat.* p. 91; in *Wood, Ind. Test. Suppl.* 2. pl. 13. f. 14.

*Hab.* In rivulis Bengalensibus.

(1601) *Cyrena Buschii*.

C. testa trigono-orbiculari, inaequilaterali, alba, incrassata, solida, tumidiuscula; epidermide olivacea-viridi vel castanea, regulariter concentricè lamellata; latere antico brevi, obtuso, declivi, rectilineo, planiusculo; postico convexiusculo, ad extremitatem obtuso; inferiore parum arcuato; umbonibus oblique prominulis, sæpius integris, cardine angusto, dentibus cardinalibus tribus, inaequalibus sensim crescentibus, duobus posticis valvæ dextræ anterioribus, valvæ sinistræ bifidis, dentibus lateralibus brevibus, antico cardine approximato.

*Cyrena Buschii*, *Phil. Abbid. Conch.* p. 8. no. 2 pl. 2. f. 2.

*Hab.* China.

(1602) *Cyrena expansa*.

C. testa crassiuscula, subinflata, inaequilaterali, rotundato-trigona, lineis transversis æquidistantibus, antice punctatis, postice crispulatis ornata nitida, extus viridi-lutea, intus tota alba; margine cardinali, brevi, anteriori et inferiori rotundatis; posteriori subexpanso, infra angulato; dentibus cardinalibus duobus bifidis, tertio simplici, in valva dextra anteriori, in sinistra posteriori; dente laterali antico subapproximato, posteriori subremoto.

*Cyrena expansa*, *Mousson, Mall. Javo* p. 89. No. 6. pl. 14.

*Hab.* Insula Javanica (*Mousson*).

(1603) *Cyrena fallax*.

C. testa ovato-trigona, plus minusve tumida, crassa, solida, in medio ventricosa, epidermide squalide, fuscescente, ferruginea, in junioribus flavescens vestita, transversim irregulariter striata; latere antico brevius, superne fere rectilineo, declivi rotundato, margine postico, superiore recto, declivi; extremitate postica sensim attenuata, breviter truncata; area plana, lævigata, angulo obtusissimo circumscripta; cardine satis latodentibus tribus inaequalibus in valva dextra crassioribus majoribus bilobatis; dente laterali antico compresso brevi, postico longiore.

*Cyrena fallax*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* Insulæ Philippinenses; Australia (*Cuming*). Coll. *Cuming*.

(1604) *Cyrena inquinata*.

C. testa orbiculato-trigona, turgida, inflata, subcordiformi, inaequilaterali, epidermide squalide fusca, fuliginosa dense irregulariter, lamellosa vestita; umbonibus tumidis profunde erosione; margine superiore antico declivi, rectilineo, postico convexiusculo, inferiore subsemicirculari; valvis solidiusculis intus albis; cardine angusto, arcuato, tridentato; dentibus inaequalibus, brevibus, obliquis, parallelis, angustis, parum prominentibus, duobus bifidis; dentibus lateralibus minimis, brevibus antico prominentiore; ligamento brevi, partim infosso; impressione pallii prope marginem decurrente.

*Cyrena inquinata*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* In fluviis Chinensibus.

(1605) *Cyrena similis*.

C. testa ovato trigona, oblonga, inaequilaterali, in medio tumida transversim distanter striata, epidermide fuscescente, ferruginea nitente vestita; umbonibus minimis decorticatis; latere antico brevi, rotundato, obtuso, latere postico superne convexiusculo, declivi, sensim attenuato, extremitate breviter subtruncato; dentibus tribus, primariis duobus subæqualibus apice inaequaliter bifidis dentibus lateralibus minimis, antico valvæ sinistræ conico, depressiusculo, postico longiore

*Cyrena oblonga*, *Desh. Proc. Zool. Soc.* 1854.



*Hab.* Manila. Coll. Cuming.

(1606) *Cyrena oviformis*

C. testa ovato transversa, crassa, solida turgida, inaequilaterali, transversim irregulariter incrementis striata; area lunulaque laevigatis, epidermide tenui, brunnea vel flavesciente vestita antice brevi declivi, obtusa, postice magis attenuata; latere superior postico convexiusculo umbonibus brevibus, depressis, apice acuminatis. saepius erosis; ligamento angusto, elongato, vix immerso; valvis profundis, intus albis; cardine angusto, arcuato, inaequaliter tridentato; dentibus divaricatis, duobus in utraque valva inaequaliter apice bilobatis dente laterali antico conico, crasso, prominenti compresso dente postico longiore, angustiore.

*Cyrena oviformis*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* Insula Basilan Philippinarum; Portus Essingtonensis. Coll. Cuming.

(1607) *Cyrena ventricosa*.

C. testa ovato-transversa, subtrigona, inaequilaterali, in senioribus, crassa solida, ponderosa, in medio turgida, epidermide squalide fusciscente aut rubiginosa, tenui, inferne posticeque breviter lamellosa et atrata, vestita intus candidissima. antice superne arcuato-declivi, obtusa postice sensim attenuata, truncata; margine superiore dorsali rectilineo, declivi; umbonibus parvis, parum obliquis; cardine angusto, tridentato, dentibus inaequalibus majoribus bifidis subparallelis: dentibus lateralibus crassis, compressiusculis-postico paulo longiore; ligamento angusto, partim immerso; area posticali planata.

*Cyrena ventricosa*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* Insulae Philippinenses; Australia. Coll. Cuming.

(1608) *Cyrena Galathea*.

C. testa cordato-trigona, inaequilaterali turgida concentricè striata, postice, longiore, truncata, antice, et inferne angulata; umbonibus distantibus, prominentibus; lunula rhomboidali, medio carinata; area lanceolata, convexa; ligamento tumido, longiore, valvis intus albis, cardine forniceque flavescens; epidermide nigrescente, antice obsolete radiata; dentibus lateralibus brevibus, antico conico intraute, postico oblongo.

*Cyrena Galathea*. *Morch. Cat. Conch. Kierulff*, p. 32. t. 2. *Zeitsch. für Malac.* No. 8. p. 128.

*Hab.* In insula Nicobar, fluv. Galathea.

(1609) *Cyrena cyprinoides*.

C. testa magna, turgida, cordata, inaequilaterali, transversim striata; epidermide viridi, antice posticeque fusciscente; cardine angusto; dentibus lateralibus brevibus.

*Cyrena cyprinoides*. *Quoy. & Gaim. Voy. del Astrol. Moll.* pl. 82. f. 1. 2. 3. (non Gray).

*Hanley. Descr. Cat.* p. 93; *Wood. Ind. Test. Suppl.* 2. pl. 14. f. 54.

*Hab.* In aquis paludosis. stagnantibus, Novae Guinea (*Quoy*).

(1610) *Cyrena divaricata*.

C. testa ovato-subcirculari, inaequilaterali, tumida, crassa, solida, epidermide fusco-nigrescente vestita, transversim, inaequaliter obsolete striata, rugis undulatis, irregularibus in latere postico divergentibus; umbonibus obliquis, profunde erosis; latere antico brevior, superne recto, declivi, in medio attenuato, sub-angulato, latere, postico lato, dilatato obtuse sub, truncato lamina cardinali lata plana; dentibus primariis tribus inaequalibus, angustissimis, in valva sinistra duobus satis valde pediculatis, in valva dextra profunde canaliculatis; dentibus lateralibus minimis, antico conico, acuto, postico oblongo, angusto.

*Cyrena divaricata*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* Nova Guinea.

(1611) *Cyrena zeylanica*

C. testa ovato-transversa, inaequilaterali, tumida, epidermide transversim striata olivaceo-viridi vestita; antice posticeque aequaliter declivi extremitatibus rotundata, inferne convexiuscula; umbonibus parum obliquis, erosis; intus alba; cardine angusto, tridentato, dentibus inaequalibus subparallelis, mediano et posticali valvae dextrae, antico et mediano valvae sinistrae apice bifidis; dentibus lateralibus brevibus, simplicibus, a cardine parum remotis.

*Rumph. xliii. F. H?*

*Cyelas Ceylanica*, *Blainv. Dict. Sci. Nat.* xii. 279.

*Venus Ceylanica*, *Chemn. Conch.* vi. 333, t. 32. f. 336.

*Venus coaxans*, *Gmel.* p. 3278, No. 41.

*Encycl.* p. 302, f. 4 a. b.

*Desh. Ency. Meth. Vers.* ii, 49, No. 8.

*Blainv. Malac.* pl. 73, f. 2.

*Mousson Moll. Java*, p. 89, No. 5. pl. 13.

*Hab.* In fluvis insulae Zeylanicae atque Javanicae.

(1612) *Cyrena sinuosa*.

C. testa ovato-rotundata, tumida, cordiformi solida, valde inaequilaterali, epidermide fusco-fuliginosa, transversim tenue lamellosa vestita; latere antico brevi, rotundato, postico subtruncato, latere supero-posticali sulco profundo sinuoso decurrente separato; umbonibus tumidis, brevibus, saepius erosis; ligamento angusto, partim infosso; valvis intus albis, cardine crasso, utroque latere tridentato, dentibus obliquis, mediano et postico dente valvae dextrae bifidis; dentibus lateralibus brevibus, antico crasso, conico, apice acuto.

*Cyrena sinuosa*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* In flumine Panimbang insulae Javanicae.

(1613) *Cyrena impressa*.

C. testa ovato-suborbiculari, obscure subquadrangulari, valde inaequilaterali, turgida, medio-criter crassa, epidermide viridiglaescente transversim tenuissime laminata, postice inferneque

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atrovirenti lamellis sæpius crispis; umbonibus minimis, oblique antice curvatis, decorticatis, acutis, parum, prominentibus; latere antico declivi rectilineo, inferne obtuso; margine superiore convexiusculo, postico latere subtruncato, sulco impresso, ab umbone descende distincto; lamina cardinali lata, dentibus primariis tribus angustis, elongatis prominentibus, apice profunde furcatis; dente laterali antico conico, brevi, compresso, postico longiore.

*Cyrena impresso*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* Insula Java (*Jukes*); insulæ Philippinenses (*Cuming*); Australia. Coll. Cuming.

(1614) *Cyrena papua*.

C. testa suborbiculari, lenticulari, depressiuscula, subæquilaterali, margine dorsali utroque æqualiter declivi et arcuata, inferiore valde arcuato; umbonibus parvis, parum prominentibus, vix obliquis, integris; epidermide viridi-glaucescente regulariter transversim striata, postice subsquamosa; valvis intus albis; cardine angusto, tridentato, dente mediano apice bifido, basi coarctato, angustiore; dentibus lateralibus parvis, simplicibus, posteriore angustiore.

*Cyrena Papua*, *Lesson, Voy. de la Coq. Zool.* p. 423; *Mag. de Zool.* pl. 11.

*Hab.* Nova Guinea et insula Waigiou dicta.

(1615) *Cyrena suborbicularis*.

C. testa suborbiculari, valde, inæquilaterali alba, sub epidermide viridi regulariter concentricè lamellata, apicibus prominulis, integris margine dorsali utroque rotundata, postico anticum sesquies æquante, ventrali valde arcuato; dentibus cardinalibus ternis, binis bifidis; lateralibus brevibus, lævibus, (*Phil.*)

*Cyrena suborbicularis*, *Phil. Abbild. Conch.* p. 7. pl. 2. f. 1.

*Hab.* Manilla.

(1616) *Cyrena placida*.

C. testa suborbiculari, sublenticulari, inæquilaterali, in medio turgidula, epidermide squalide fuscescente tenuissime striata vestita; umbonibus, brevibus erosione vix prominentibus; latere antico breviori late rotundato, postico truncato angulo decurrente obtusissimo separato; cardine latodentibus inæqualibus angustis, elongatis subparallelis, depressis, apice late canaliculatis; dentibus lateralibus subæqualibus depressis compressis, postico minore.

*Cyrena placida*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.*—? Coll. Cuming.

(1617) *Velorita cyprinoides*.

V. testa trigonali, altiori quam lata, cordiformi, valde inæquilaterali, crassa, tumida, solidissima, transversim regulariter sulcata, sulcis antice posticeque evanescentibus; epidermide olivaceo-fuscescente nitidissime vestita, latere antico lateore, late semicirculari, postico brevissimo, recto valde declivi, angulo obtuso circumscripto; cardine lato, crasso, brevi, inæqualiter tridentato, denti-

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bus angustis, elongatis parallelis, apice vix canaliculatis; dente laterali antico, maximo crasso, cardine valde approximato, postico longiore, angusto, valde separato.

*Cyrena cyprinoides*, *Gray Ann. Phil.* 1825, p. 137.

*Velorita cyprinoides*, *Gray in Griff. Anim. Kingd.* pl. 31, f. 5; *Ann. & Mag. N. H.* ser. 2. xi. 39.

*Venus cyprinoides*, *Gray in Wood. Ind. Test. Suppl.* pl. 2 f. 11.

*Hab.* Fulvis Japonicis.

*Corbicula arata*. Benson. *Tenasserim River.*

(1618) *Corbicula africana*.

C. testa parva, orbiculato-trigona, compressiuscula, subæquilaterali, antice latiore, obtusiore, transversim dense et irregulariter striata, olivaceo-glaucescente nitida, intus violacea; umbonibus minimis, gibbosulis, erosione, cardine angusto, tridentato, dentibus minimis, decubus approximatis, æqualibus, apice canaliculatis; dentibus lateralibus angustis, elongatis, tenuissime striatis; impressionibus muscularibus minimis, rotundatis.

*Cyrena africana*, *Krauss, Sudafr. Moll.* p. 8. pl. 1. f. 8, varietatibus exclusis.

*Hab.* Caput Bonæ Spei.

(1619) *Corbicula fluminalis*.

C. testa triangulari, transversim striata, crassa, dura, valde gibba, opaca, antice versus cardinem latiore, quam postice; extus viridi, crebro striatim imbricata; striæ transversæ; valvis intus cyaneis; cardine in utraque valva tridentato, dentibus divaricatis, subæqualibus, postico emarginato; dentes laterales elongati utroque latere tenue striati; striis tenuibus, perpendiculariter parallelis.

*Tellina fluminalis*, *Mull. Verm. Hist.* ii. 205.

*Venus fluminalis*, *Chemn. Conch.* vi. 319. pl. 30. f. 320.

*Wood, Ind. Test.* pl. 8. f. 113.

*Tellina fluminalis*, *Schrot. Flussconch.* p. 195, no. 20.

*Gmel.* p. 3242. no. 79.

*Cyclas fluminalis*, *Blainv. D. S. N.* xii. 280.

*Venus*, *Schrot. Einl.* iii. 158. no. 11.

*Cyclas*, *Enc. Meth.* p. 301. f. 2.

*Cyclas Euphratica*, *Lamk. Syst. An. s. Vert.* p. 124.

*Cyrena fuscata*, var. ?, *Lamk. An. s. Vert.* v. 552. no. 4.

*Hab.* Ex. oriente, *Lamk.* In Euphratico flumine.

(1620) *Corbicula ambigua*.

C. testa ovato-trigona, æquilaterali subcordiformi, transversim dense striato-sulcata; striis regularibus, antice posticeque evanescentibus; epidermide nitente, nigro-virescenti vestita, in latere postico tenuissime striato-lamellosa, intus violacea; umbonibus angustis, prominentibus, antice obliquatis; latere antico atque postico



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aequaliter convexiusculis, declivibus, obtusis; cardine angusto, dentibus tribus primariis inaequalibus brevibus simplicibus, antico valvæ dextræ dente laterali adnato; dentibus lateralibus aequalibus, longis extremitate inferiore leviter arcuatis, crenulato-striatis.

*Corbicula ambigua*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* Flumen Euphrates.

d. *Species Indicae.*

(1621) *Corbicula occidens*.

C. testa ovato-transversa, æquilaterali, tumida, tenui, transversim regulariter lirato-sulcata; epidermide flavescens-viridi vestita, ad umbones atro-violascente vel breviter albo radiata; umbonibus tumidis, brevibus, lævigatis; lunula ovato-lanceolata, pallida, lævigata; valvis intus profunde fusco-violascentibus; cardine angusto, inaequaliter tridentato; dentibus lateralibus brevibus angustis albis tenue striatis.

*Corbicula occidens*, *Bens. Asiat. Journ.* 1824?

*Hab.* India; loco Sikkim dicto, Moredabad, Bengal, Coll. Cuming.

(1622) *Corbicula Bensoni*.

C. testa ovato-transversa, subtrigona, æquilaterali, lævigata, nitida, depressiuscula, extremitatibus obtusa, utroque latere aequaliter declivi; epidermide tenui, intente, virescente vel flavescens induta, aliquantisper lineis interruptis fuscis radiata, alba vel pallide violascente; cardine angusto, tridentato, dentibus inaequalibus valde divaricatis dentibus lateralibus prælongis angustissimis, tenuissime striato crenatis, antico paulo longiore.

*Corbicula Bensoni*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* In rivulis Bengalensibus (*Benson*). Coll. Cuming.

(1623) *Corbicula Bengalensis*.

C. testa ovato-subtrigona, depressiuscula, tenui, subæquilaterali, obsolete transversim striata, striis regularibus distantibus; epidermide flavescens nitidissima, intus alba, in medio macula rubescens notata; umbonibus minimis acutis; cardine angusto tridentato, altero bidentato; dentibus lateralibus angustissimis, argute striatis.

*Corbicula Bengalensis*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* In rivulis Bengalensibus, Coll. Cuming.

(1624) *Corbicula striatella*.

C. testa ovato-transversa, depressiuscula, subæquilaterali, extremitatibus aequaliter obtusa, transversim regulariter lirata, liris ad latus posticum evanescentibus; epidermide pallide viridescens, nitente vestita; intus atro-violacea; umbonibus brevibus, atro-violascentibus, pallidioribus biradiatis; cardine angusto, tridentato; dentibus inaequalibus, divaricatis, postico longiore et angustiore, dentibus lateralibus elongatis, angustis, subæqualibus, arcuatis, tenuissime striatis.

*Corbicula striatella*, *Desh. Proc. Zool. Soc.* 1854.

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*Hab.* Pondicherry. Coll. Cuming.

(1625) *Corbicula trigona*.

C. testa trigona, æquilaterali, compressiuscula, antice paulo latiore et obtusiore, utroque latere aequaliter declivi, transversim tenue et regulariter striata; epidermide viridi, nitente induta, intus pallide violacea; umbonibus minimis, brevibus, acutis; lunula ovata, angulo obsoleto circumscripta, pallida, lævigata; cardine angusto, altero bidentato altero tridentato; dentibus lateralibus aequalibus, tenuissime striatis antico leviter arcuato.

*Corbicula trigona*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* Pondicherry, Coll. Cuming.

(1626) *Corbicula Cashmiriensis*.

C. testa ovato-transversa, subtrigona, æquilaterali, tumidula, transversim tenue et regulariter striata, striis postice evanescentibus; epidermide nitida, atro-virescente, in latere postico tenuissime striato vestita; umbonibus tumidis, prominentibus, profunde erosis, violaceis; cardine angusto, in valva dextra bidentato, in altera tridentato, valvulæ dextræ dente antico laterali adnato; dentibus primariis divergentibus, simplicibus, lateralibus, longis, angustis, antico longiore cardine proximo; valvis intus violaceis, impressione pallii margine valve remoto.

*Corbicula Cashmiriensis*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* Cashmere, Coll. Cuming.

(1627) *Corbicula Woodiana*.

C. testa subtrigona, subinflata, micante, subæquilaterali, transversim rugata; valvulis crassis; natibus magnis et rotundatis; dentibus cardinalibus subbifidis, lateralibus longis, serratis rectisque; margarita alba.

*Cyrena Woodiana*, *Lea. Trans. Amer. Phil. Soc.* v. 110 pl. 18, f. 55; *Observ. on the Genus Unio.* i. 222, pl. 18, f. 55.

*Wood Ind. Test. Suppl.* 2. pl. 14, f. 58.

*Hab.* In rivulis Chinensibus prope Canton.

(1628) *Corbicula grandis*.

C. testa orbiculato-trigona, solida, tumidula, inæquilaterali, transversim irregulariter rugosa, antice sulcis magis regularibus exarata; latere antico brevior, late arcuato, postico magis attenuato; epidermide nitidissima nigrescente vestita, ad margines flavescens, postice squamosa; valvis intus pallide flavis; cardine incrassato, tridentato, dentibus approximatis, lateralibus brevibus, crassis, irregulariter striato-denticulatis.

*Corbicula grandis*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* China? Coll. Cuming.

(1629) *Corbicula similis*.

C. testa trigona, paululum latiore quam alta, depressiuscula, subæquilaterali, transversim tenue sulcata, postice sulcis evanescentibus; latere antico rotundato, obtuso, postico productiore

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cuneiformi, angulato; umbonibus prominentibus, recurvis, oppositis, decorticatis; ligamento brevi, angusto, partim immerso; epidermide viridi-suscescente ad margines glaucescente; valvis intus albis, ad margines lutescentibus, cardine tridentato, nymphis basi irregulariter granoso-rugosis; dentibus lateralibus prælongis, angustis, transversim late profundeque sulcatis.

Venus similis, *Gray in Wood, Ind. Test. Supp.* 1. pl. 2. f. 5.

Cyrena similis, *Gray, in Griff. Anim. Kingd.* pl. 20. f. 2.

*Hab.* China?

## (1630) *Corbicula Largillierti*.

C. testa rotundato-trigona, subæquilaterali, compressiuscula, postice angustiore, subangulata; striis transversis confertissimis; epidermide olivacea, apicibus et pagina interna violaceis; dentibus lateralibus elongatis, striatis.

Cyrena Largillierti, *Phil. Abbild. Conch.* pl. 1. f. 1.

*Menke, Zeits. für Malak.* 1844. p. 163.

*Hab.* China.

## (1631) *Corbicula recurvata*.

C. testa trigona, brevi, alta, crassa, cordiformi, æquilaterali; lateribus subæqualibus, fere rectilineis, latere antico obtuso, postico angulato, margine inferiore vix arcuato; umbonibus angustis, prominentibus, oppositis, sæpius erosis; facies externa regulariter transversim sulcata, epidermide flavesciente fusco zonato; valvis intus albis; cardine bidentato, dentibus lateralibus rectis, longissimis, simplicibus.

Cyrena recurvata, *Eydoux, Moll. du Voy. de la Favorite, Mag. de Zool.* p. 11. pl. 119. f. 2.

*Hab.* In fluviis Chinæ, atque lacu et rivis prope Manillam.

## (1632) *Corbicula fluminea*.

C. testa triangulari, gibba, opaca, antice et postice versus cardinem fere æqualis, epidermide viridi vestita, costis latis, transversim quasi circulis doliaribus circumdata intus albida, *semicirculo nigro notata*; dentibus cardinalibus et fossulis uti in præcedente (fluviatilis, *Muller*).

*Tellina fluminea, Mull. Verm.* ii. 206.

*Gmel.* p. 3243. no. 80.

*Cyclas fluminea, Blainv. D. S. N.* xii. 280.

*Venus fluminea, Chemn. Conch.* vi. 320. pl. 30 f. 322, 323, an eadem species?

*Schrot. Einl.* iii. 159. no. 13.

*Wood. Ind. Test.* pl. 8. f. 114.

*Tellina fluviatilis, Schrot. Flussconch.* p. 193. pl. 4. f. 2. a. b.

*Cyrena fluminea, Lamk. An. s. Vert.* v. 553. no. 5.

*Hanley, Descr. Cat.* p. 92.

*Phil. Abbild. Conch.* p. 2. no. 3. pl. 1. f. 3, an eadem species?

*Mousson, Moll. de Java,* p. 87. no. 2. pl. 15. f. 3.

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*Hab.* In arena fluviatili Chinæ (*Muller*); Java (*Mousson*); Manila (*Cuming*).

## (1633) *Corbicula fluviatilis*.

C. testa triangulari, transversim rugosa; testa latior et tenuior, proxima præcedenti (fluminalis), fusco-virens, in cardine antice et postice æqualis latitudinis; lineis elevatis cincta (*Mull.*)

*Tellina fluviatilis, Mull. Hist. Verm.* ii. 206.

*Gmel.* p. 3243. no. 81.

*Cyclas fluviatilis, Blainv. D. S. N.* xii. 280.

*Venus fluviatilis, Chemn. Conch.* vi. 320. pl. 30. f. 321.

*Wood, Ind. Test.* pl. 8. f. 115.

*Venus, Schrot. Einl.* iii. 158. no. 12.

*Cyrena fuscata, Lamk. An. s. Vert.* v. 552. no. 4. exclus. var.

*Cyrena fluviatilis, Phil. Abbild. Conch.* p. 3. n. 5. pl. 1. f. 5?

*Cyrena Manilensis, Phil. Zeits. für Malac.* 1841, p. 163.

*Hab.* In flumine emporium Canton, Chinæ præterlabente (*Muller*).

## (1634) *Corbicula orientalis*.

C. testa rotundato-ovata, subtrigona, subæquilaterali, solida; apicibus erosis, obtusis; striis transversis regularibus remotis; epidermide olivaceo-atra; dentibus cardinalibus duobus in valvula dextra; dentibus lateralibus elongatis striatis.

*Cyrena orientalis, Lamk. An. s. Vert.* v. 552. no. 2, exclus. var.

*Desh. in Lamk. ed. 2.* vi. 273, no. 2.

*Anton, Vert. der Conch.* p. 13. no. 496, excl. syn.

*Phil. Abbild. Conch.* p. 1. no. 2. pl. 1. f. 2.

*Hab.* In China; in fluvio emporium Canton præterlabente, frequentissima; pro calce uritur (*Phil.*)

## (1635) *Corbicula nitens*.

C. testa trigona, inæquilaterali, tenui, tenuissime et confertissime transversim striata, olivaceo-flava; extremitate postica subrostrata fusca; dentibus lateralibus elongatis striatis.

*Cyrena nitens, Philippi in Menke, Zeits. für Malac.* 1844, p. 153;

*Abbild. Conch.* p. 76. pl. 1. f. 4.

*Hab.* China.

## (1636) *Corbicula compressa*.

C. testa ovato-trigona, transversa, subæquilaterali, fusca, transversim tenue et regulariter sulcata; antice brevior, obtusa, postice obscure truncata; sulcis ad latus posticum evanidis; umbonibus obtusis, brevissimis decorticatis; valvis tenuibus, intus atro-violaceis; cardine angusto, sæpius candido, tridentato; dentibus lateralibus angustis, acutis tenuissime striatis.

*Cyrena compressa, Mousson. MSS. fide Morelet.*

*Hab.* In rivulis insulæ Javanæ.

## (1637) *Corbicula Moussoni*.



C. testa ovato-transversa, convexiuscula, inæquilaterali, transversim striato-sulcata, striis remotis, æqualibus, fusco-nigra; umbonibus inflatis, obtusis, erosis; cardine angusto; dentibus cardinalibus tribus, dente mediano crassiore, postico angusto obsoleto; dentibus lateralibus angustis, brevioribus tenuissime striatis; valvis intus violaceis, ad dentes laterales fusco-violaceis.

Cyrena orientalis, var. Javanica, *Mousson, Moll. terr. et fluv. de Java*, p. 85. pl. 15. f. 2.

*Hab.* Tikojia in insula Javanica.

(1638) *Corbicula pulchella*.

C. testa ovato-orbiculari, vix trigona, subæquilaterali, lenticulari, apicibus perspicuis, transversim tenuiter sulcata, extus olivacea, intus pallide luteo-alba; margine cardinali brevi, anteriori angulo rotundato inferiori juncto; posteriori subtruncato; dentibus lateralibus valde elongatis, tenuissimis, minute serrulatis; dentibus cardinalibus minutis, intraque valva, angulo cardinali 120.

Cyrena pulchella, *Mousson, Moll. Java*, p. 88. no. 3. pl. 15. f. 4.

*Hab.* Insulam Javanicam prope Tjikoya.

(1639) *Corbicula rivalis*.

C. testa trigona orbiculari, æquilaterali, compressa, satis tenui, olivacea, sulcis concentricis confertis cincta; umbonibus acutiusculis, parum prominentibus; dentibus lateralibus elongatis, serrulatis, anticis subæqualibus; pagina interna omnino violacea.

Cyrena rivalis, *Von dem Busch in Pill. Abbild. Conch.* iii. 110. no. 5. pl. 3. f. 5.

*Hab.* Java.

(1640) *Corbicula Cumingii*.

C. testa ovata, subtrigona, inæquilaterali, tenui, turgida, subcordiformi; epidermide nitente viridescente vestita, transversim regulariter-sulcata, sulcis distantibus postice evanidis; umbonibus tumidis, prominentibus, lævigatis, atro-violaceis, sæpius, integris, oppositis; cardine angusto, inæqualiter tridentato, dentibus divergentibus; nymphis basi granoso-corrugatis; dentibus lateralibus angustis elongatis, æqualibus, antico in medio prominentiore.

*Corbicula Cumingii*, *Desh. Proc. Zool. Soc.* 1854.

Var. Testa globulosa, ventricosiore.

*Hab.* Insula Luzon Philippinarum, (*Cuming*); India, Bareilly loco dicto, (*Benson*).

(1641) *Corbicula Malaccensis*.

C. testa ovato-transversa, subtrigona, inæquilaterali, turgidula, solidula; epidermide glaucescente vestita, transversim regulariter et tenue sulcata, extremitatibus obtusa, latere antico longiore; cardine angusto, tridentato, altero bidentato; dentibus lateralibus angustis, tenuissime striatis, antico longiore, valvis intus albis vel pallide violaceo tinctis.

*Corbicula Malaccensis*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* In rivulis ad Malaccam affluentibus. Coll. *Cuming*.

(1642) *Corbicula tumida*.

C. testa regulariter ovato-transversa, tumida, tenui, subæquilaterali, postice paulo longiore, utraque extremitate æqualiter obtusa; epidermide viridi, nitente vestita, transversim sulcata, sulcis valde distantibus; umbonibus parvis, turgidulis, integris; cardine angustissimo, dentibus cardinalibus tribus angustis, inæqualibus, valde divergentibus lateralibus angustissimis, arcuatis, argute crenulato-striatis.

*Corbicula tumida*, *Desh. Proc. Zool. Soc.* 1854.

Var. Testa, juniore epidermide glaucescente, valvulis intus extusque fusco trimaculatis.

*Hab.* Borneo. Coll. *Cuming*, pro varietate.

(1643) *Batissa rotundata*.

B. testa rotundata, sublenticulari, subæquilaterali, transversim rugata; latere posteriori rugoso; valvulis crassis; natibus parvis, acutis, contiguis; dentibus cardinalibus subbifidis; lateralibus longis, minute serratis, rectisque; margarita alba et purpurea.

Cyrena rotundata, *Lea, Trans. of Amer. Phil. Soc.* v. 107. pl. 17. f. 51; *Observ. on the Genus Unio*, i. 319. pl. 17. f. 51.

*Hanley, Descr. Cat.* p. 93; in *Wood, Ind. Test. Suppl.* 2. pl. 14. f. 55.

*Hab.* Java; insulæ Philippinenses.

(1644) *Batissa eximia*.

B. testa ovato-orbiculari, crassiuscula, inæquilaterali, transversim striata, margine subrugosa, umbonibus tumidis, obliquis, haud erosis, plicis obsoletis rugulosis irregularibus ab iisdem ad latus posticum decurrentibus; epidermide atro-fusca marginem versus sublamellosa; intus alba, dentibus cardinalibus in utraque valva tribus, majoribus bifidis, lateralibus valvæ sinistrae haud crenulatis, antico valde crasso, brevi, cardine approximato, dente postico remoto, longiore, subcompresso, ligamento peculiari crasso, in dorso compresso et carinato.

Cyrena eximia, *Dunk. Zeitsch. für Malac.* 1852. p. 51. no. 4.

*Hab.* In flumine Progo, prope Mangelang, in insula Java.

(1645) *Batissa Keraudrenia*.

B. testa obovata, inæquilaterali, crassa, solida, compressiuscula, maxima latere antico brevi, rotundato, postico latiore, superne subdeclivi, angulum obtusum ad extremitatem ligamenti formante, margine ventrali convexiusculo; umbonibus recurvis, prominulis; obliquis, approximatis, sæpius integris aliquantisper erosis ligamento permagno, prominente cylindræo, postice subito truncato; epidermide crassa, atro-fuscescente vel olivacea valvis intus albis, ad margines inferne posticeque purpureo-violaceis; cardine incrassato dentibus cardinalibus inæqualibus, mediano valvæ dextræ majore, antico brevior, postico angustiore et longiore dentibus laterali-

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bus angustis, elongatis, superne transversim striatis, aliquantisper violaceo tinctis.

Cyrena Keraudrenia, *Lesson. Voy. de la Coq. Moll.* p. 429. pl. 11. f. 3 (1829).

Cyrena philippinarum, *Hanley, Proc. Zool. Soc.* 1844, p. 259; in *Wood. Ind. Test. Suppl.* 2 pl. 14. f. 60.

Var. Testa paulo depressiore, postice angulata.

Hab. Insula Waigiou dicta atque insulæ Philippinenses; fluviis insulæ Nicobaricæ.

(1646) *Batissa insignis*.

B. testa ovato-orbiculari, oblique inæquilaterali, tumida, tenui, intus violacea, epidermide nigro-virescente, nitido vestita, in latere antico late sulcata, sulcis remotis, ad lunulam sæpius inter se conjungentibus; umbonibus prominentibus erosis, antice inclinatis; cardine angusto, obliquo, inæqualiter tridentato; dentibus in valva sinistra angustioribus, mediano bifido, in dextra crassioribus simplicibus; dentibus lateralibus angustis, postico valvæ sinistræ laminato apice regulariter serrulato.

*Batissa insignis*, *Desh. Proc. Zool. Soc.* 1854.

Hab. Calamang, insula Luzon Philippinarum. Coll. Cuming.

(1647) *Batissa triquetra*.

B. testa trigona, obliqua, inæquilaterali, cuneiformi, lævigata, epidermide nigro vestita, depressiuscula; margine antico rectilineo postico valde convexo, dilatato, inferiore vix arcuato; umbonibus profunde erosis; lamina cardinali angusta, dentibus cardinalibus tribus inæqualibus, brevibus, subcanaliculatis; lateralibus elongatis, angustis, subæqualibus, antico cardine adnato, postico remoto; valvis tenuibus intus albis.

*Batissa triquetra*, *Desh. Proc. Zool. Soc.* 1854.

Hab. Insulæ Philippinensis; Australia. Coll. Cuming.

(1648) *Batissa producta*.

B. testa suborbiculari, valde obliqua, inæquilaterali, depressiuscula, crassa, solida, transversim late et obsolete plicata vel subundulata, epidermide polita, atro-virescente vestita, intus superne alba, postice inferneque violacea; umbonibus magnis, productis, antice obliquatis; cardine lato, crasso, valde obliquo, inæqualiter tridentato dentibus majoribus superne obsolete, canaliculatis, lateralibus validis, antico, crasso, obsolete rugoso vel striato, postico compressiore et paulo longiore, latere antico brevi rotundato, postico dilatato.

*Batissa producta*, *Desh. Proc. Zool. Soc.* 1854.

Hab. Insulæ Philippinenses. Coll. Cuming.

(1649) *Batissa Childrenæ*.

B. testa ovato-subrotunda, obliqua, inæquilaterali, depressiuscula, crassa, solida, postice ab umbonibus obscure subangulata, epidermide fusco-viridi nitente induta, intus alba, in fornice sæpius aurantio-purpurascens postice violacea; latere antico brevior, obtuso, transversim inæ-

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qualiter sulcato; sulcis in medio evanidis; latere postico latiore rugis irregularibus divergentibus notato, lamina cardinali lata, crassa, dentibus primariis tribus inæqualibus, in utraque valva medianis validioribus; dentibus lateralibus subæqualibus, antico basi lato.

*Cyrena Childrenæ*, *Gray. Ann. Phil.* 1825, p. 117.

Venns Childreni, *Gray in Wood, Ind. Suppl.* pl. 2 f. 13.

Var. Testa mimore paulo transversiore magis depressa.

Hab. Insulæ Philippinenses.

(1650) *Batissa lenticularis*.

B. testa orbiculari, tantum alta quam lata, æquilaterali, subsymmetrica, lenticulari, turgidula, epidermide nitidissima atro-virescente vestita, lineis longitudinalibus tenuissimis obsoletis irregulariter in medio radiata, intus albo-violacea; latere antico posticum æquante et æqualiter obtuso; cardine angusto, tridentato; dentibus majoribus superne canaliculatis, mediano valvæ dextræ majori; dentibus lateralibus subæqualibus, antico crassiore, tenue rugoso, postico laminato obsolete striato; umbonibus parvis, acutis, integris, oppositis.

*Batissa lenticularis*, *Desh. Proc. Zool. Soc.* 1854.

Hab. Insulæ Philippinenses (Cuming). Coll. Cuming.

(1651) *Batissa Jayensis*.

B. testa subrotunda, inæquilateralis, antice rugosa; valvulis crassis; natibus parvis, elevatis; dentibus cardinalibus bifidis; lateralibus longis, minute seritis rectisque margarito purpurea.

*Cyrena Jayensis* (Jayana), *Lea, Trans. of Amer. Phil. Soc.* v. 108. pl. 17 f. 52; *Observ. of Gen. Unito.* i. 220. pl. 17 f. 52.

Hab. In fluviis insulæ Sumatrensis.

(1652) *Batissa violacea*.

B. testa ovato-transversa, elliptica, compressa inæquilateralis, crassa, solida, antice posticeque obtusa; margine superiore utroque declivi; umbonibus tumidulis, decorticatis, parum obliquis; latere antico lata sulcata, postico irregulariter striato; epidermide crassa, viridi-fuscescente, polita; valvis intus purpureo-violaceis vel vivide purpuratis; cardine crasso; dentibus inæqualibus, lateralibus transversim sulcatis.

*Cyclas*, *Brug. Ency.* pl. 301. f., a. b.

*Cyrena violacea*, *Lamk. An. s. Vert.* v. 553. no. 7.

*Desh. Ency. Meth. Vers.* ii. 49. no. 9; in *Lamk. An. s. Vert.* ed. 2. vi. 275. no. 7.

*Deless. Rec. de Coq of Lamk.* pi. 7. f. 5.

*Hanley. Descr. Cat.* i. 92.

*Anton, Verz. der Conch.* p. 13. no. 499.

*Wood, Ind. Test. Suppl.* 2. pl. 13. f. 13.

*Phil. Abbild. Conch.* iii. 208. no. 2. pl. 2. f. 2.

Var. suborbicularis, *Mousson, Moll. de Java*, p. 88. pl. 15, f. 1? (an altera species?)



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*Hab.* Nova Guinea (Lesson) Var. *subordicularis* insulæ Javanicæ (Mousson).

(1653) *Batissa corbiculoides*.

B. testa oblique triangulari, inæquilaterali, tumida, crassa, solidæ, epidermide squalide viridifuscente vestita, transversim inæqualiter sulcata et striata; umbonibus productis erosis, obliquis; lunula angulo obtusissimo nota, magna, ovato-lanceolata, lævigata; area posticali rugis irregularibus obsoletis divaricatis corrugata; cardine lato, crasso, inæqualiter tridentato, dentibus compressis, divergentibus, simplicibus; dentibus lateralibus sicut in Corbiculis elongatis, angustis, tenue striatis, antico paulo brevioribus; valvis intus albis, in margine postico violaceo maculatis.

*Batissa corbiculoides*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* Nova Guinea (Jukes).

(1654) *Batissa humerosa*.

B. testa trigona, inæquilaterali, cuneiformi, superne gibbosa, transversim inæqualiter striato-sulcata; epidermide nigrescente vestita, intus alba, in medio pallide purpureo tineta; latere antico rectilineo, valde declivi, inferne obtuso angulato, margine dorsali leviter convexo, declivi. margine inferiore parum arcuato, rugis aliquibus in latere postico divergentibus; umbonibus profunde erosis; cardine lato, tridentato, dentibus; inæqualibus simplicibus, medianis majoribus; dente laterali antico cardine adnato, irregulariter corrugato, postico longiore, angustiore, striis brevibus notato.

*Batissa humerosa*, *Desh. Proc. Zool. Soc.* 1854.

*Hab.* Nova Guinea Coll. Cuming.

? *cyrenoides*. *Syn. cyrenella*, *rec.* 1 sp.

Family XIII. Cyprinidæ.

Genera. *Cyprina*. *Syn. Arctica*, *recent*, also *fossil* 90 sp.

*Circe*, *rec.* 37 sp.

*Circe. Aden.*

*Circe scripta*, variety. *Singapore*.

(1655) *Circe personata*, *Desh.*

C. testa compressa; costis concentricis numerosis; margine dorsali rectiusculo, elevato, subcomplanato; lunula distincta; costulis divergentibus, prope umbones indistinctis.

*Venus scripta*, *Chemn. (non Linn) Conch.* vii. 31 pl. 40. f. 420, 421, 422.

(ex. parte), *Dillw. Cat.* p. 201.

*Enycl. Meth.* pl. 273. f. 5 ?

*Cytherea scripta*, *Lamk. An. s. Vert.* v. 575. no. 57.

*Hanley. Descr. Cat.* p. 108.

*Circe violacea* (ex parte), *Schumacher, Essai d'une Class.* p. 152. pl. 15. f. 3.

*Circe scripta*, *Gray. Cat. Cyth. Anal.* viii. 307.

*Sow. Thes. Conch.* p. 651. pl. 139. f. 38, 39, 40, 42.

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*Hab.* Oceanus Indicus et Chinensis; mare Australe.

(1656) *Circe personata*.

C. testa suborbiculato-trigona, depressa, lenticulari, inæquilaterali, ad umbones compressa, transversim tenuistriata, striis in latere postico evanescentibus; albo-grisea fusco in media maculata, ad margines sæpius lineolata; maculis in medio sæpius daubus personatis; lunula areaque minimis, angustis, lanceolatis, atro-castaneis; valvis intus in fornice violaceis, in margine albis; impressione musculari antica ovato-oblong; fossula laterali valvæ dextræ usque ad dentem cardinalem prolongata; impressione pallii ad marginem descendente.

*Circe personata*, *Desh. Proc. Zool. Soc.* 1858.

*Hab.* Oceanus Indicus; Insulæ Philippinenses.

(1657) *Circe corrugata*.

C. testa subcomplanata, postice, subangulata, polita, prope umbones rugulosa, griseascente fulva, minute lineis rubris omnino scripta, postice subquadrata; marginibus dorsalibus declivibus rubris; costis elevatis, distinctis, postice subangulatis.

*Venus corrugata. Chemn. Conch.* vii. 25. pl. 39. f. 410, 411.

*Dillw. (ex parte), Cat.* i. 201 (pro figura *Chemnitzii*).

*Venus scripta*, var. (ex parte), *Gmel.* p. 3286, (pro figura *Chemnitzii*).

*Cytherea rugifera*, *Lamk. An. s. Vert.* v. 579. no. 70.

*Hanley. Descr. Cat.* p. 108.

*Circe corrugata*, *Gray. Cat. Cyth. anal.* viii. 307.

*Circe rugifera*, *Sow. Thes. Conch.* p. 652. pl. 139, f. 44, 45.

*Savigny, Descr. d' Egypte*, pl. 6. f. 2.

*Hab.* Mare Rubrum et Madagascariense.

(1658) *Circe crocea*.

C. testa obliqua, forma variante, marginibus rotundatis, albida, epidermide lutea induta, nonnunquam fusco prope umbones biradiatim picta, intus lutea, antice concentricè sulcata, postice lævigata; umbonibus divaricatim rugatis; lunula et area dorsali subpurpureis.

*Cytherea*, *Savigny, Descr. d' Egypte*, pl. 9. f. 3.

*Circe crocea*, *Gray Cat. Cyth. Anal.* viii. 307.

*Sow. Thes. Conch.* p. 953, pl. 139, f. 49. 52.

*Cytherea crocea*, *Hanley, Descr. Cat.* p. 103.

*Hab.* Mare Rubrum.

(1659) *Circe sulcata*.

C. testa oblique rotundato trigona, lenticulari, depressa minute transversim sulcata, fusca, vel fulva, aut grisea fulvo fuscove radiata et variegata; lunula plana, elongato lanceolata; area lunulaque minute divaricatim striatis.

*Circe sulcata*, *Gray. in Anal.* (1838) viii. 807.

*Cytherea sulcata*, *Hanley, Descr. Cat.* p. 103.

*Cytherea plebeia*, *Hanley, Proc. Zool. Soc.* 1844, p. 106.

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*Hanley, in Wood, Ind. Sub. pl. 5. f. 37.*  
*Cytherea erythraea, Jonas, in Phil. Abbild. Conch. iii. 39. pl. 9. f. 2.*  
*Circe plebeia, Sow. jun. Thes. Conch. p. 650 pl. 138. f. 33-37*  
*Hab. Insulae Philippinenses (Cuming.)*  
 (1660) *Circe divaricata.*  
*C. testa subelongata, depressa, postice suba, cuminata; costis vix noduliferis, numerosis, postice obliquis, medio radiatis, prope angulum posticum acutangulatim confluentibus.*  
*Favanne, Conch. pl. 49, f. E. 2.*  
*Encycl. Meth. pl. 271, f. 5. &c. pl. 274. f. 2.*  
*Pectunculus, Lister Conch. pl. 310 f. 146.*  
*Venus divaricata, Chemn. Conch. vi. 317. pl. 30 f. 316.*  
*Gmel. p. 3077, no. 35.*  
*Brooks, Introd. p. 66. pl. 2. f. 24.*  
*Dillw. Cat. i. 200. no. 96.*  
*Wood, Ind. Test. pl. 3. f. 94.*  
*Venus incrassata ? Born. Test. Mus. p. 37. exclus, Regenf. syn.*  
*Cytherea divaricata, Lamk. An. s. Vert. v. no 66; ed 2. vi. 324. no. 66.*  
*Hanley, Descr. Cat. p. 180.*  
*Var. Cythera testudinalis, Lamk.*  
*Venus discors, Schrot. Einl. iii. 199. pl. 8. f. 11.*  
*Dillw. (ex parte), Cat. i. 199. no 93.*  
*Circe divaricata, Gray. Cat. Cyth. Anal. viii. 307.*  
*Sow. Thes. Conch. p. 650 pl. 137. f. 8. 9.*  
*Cytherea testudinalis, Lamk. An. s. Vert. v. 578; ed 2. vi. 325.*  
*Cytherea æquivoca, Sow. Thes. Conch. p. 650 pl. 137. f. 12. 15.*  
*Hab. Mare Rubrum; Africa orientalis; oceanus Indicus; insulae Philippinenses.*  
 (1661) *Circe dispar.*  
*C. testa rubro punctata et angulatim variegata; postice costis divaricatis, antice concentricis.*  
*Encycl. Meth. pl. 271, f. 6.*  
*Venus dispar, Chemn. Conch. xi. 230, pl 202. f. 1981, 1982.*  
*Dillw. Cat. i. 199, no. 94.*  
*Wood. Ind. Test. pl. 8. f. 92.*  
*Cytherea Muscaria, Lamk. An. s. Vert. v. 576, no. 59.*  
*Cytherea Pulicaris, Lamk. loc. cit. no. 60.*  
*Delessert, Rec. de Coq. pl. 9. f. 5.*  
*An eadem var.? Cytherea mixta, Lamk. loc. cit. no. 61.*  
*Desh. in Lamk. An. s. Vert. vi. 321. nos 59. 60, 61.*  
*Cytherea dispar, Hanley, Descr. Cat. p. 103.*  
*Circe dispar, Gray. Cat. Cyth. Anal. viii. 307.*  
*Sow. Thes. Conch. p. 650. pl. 37. f. 10, 11.*  
*Hab. Mare Rubrum.*  
 (1662) *Circe transversaria.*  
*C. testa ovato-transversa, subæquilaterali, depressa, antice rotundata, postice subtruncata,*

# MOLLUSCA.

*fusca, sæpius ad umbones albo angulatim maculata; antice posticeque divaricatim rugosa, in medio transversim sulcata, sulcis rugisque granosis; umbonibus minimis brevibus oppositis; lunula elongato-lanceolata, linea impressa circumscripta atrata; vulva subplana, lævigata; intus alba, in medio violaceo maculata.*  
*Circe transversaria, Desh. Proc. Zool. Soc. 1853.*  
*Var. C. Testa minore, sulcis transversis majoribus.*  
*Hab. Insulae Philippinenses. Coll. Cuming.*  
 (1663) *Circe pectinata.*  
*C. testa oblonga, plerumque subcompressa, postice subquadrata; costis nodulosis numerosis, postico divaricatis, tum gradatim radiantibus antice divaricatis; margine dorsali excavato: variat costis magnis.*  
*Pectunculus, Lister. Conch. pl. 312. f. 148.*  
*Rumph. Amb. pl. 43. f. D.*  
*Petiver, Amb. pl. 18. f. 41.*  
*Favanne, pl. 46. f. E. 1.*  
*Concha crassa, Gualt. Ind. pl. 72. f. E. F. and pl. 75. f. A.*  
*Venus pectinata, Linn. Syst. Nat. ed. 10. p. 689; ed. 12. p. 1135.*  
*Linn. Mus. Utr. ii. 507. no. 72.*  
*Born. Test. Mus. p. 74.*  
*Venus pectinata, (ex parte), Chemn. Conch. vii. 28 pl. 39. f. 418, 419?*  
*Venus, Encycl. Meth. pl. 271. f. 1. a. b.*  
*Venus discors (ex parte), Dillw. (non Gmel) Cat. p. 199. no. 93.*  
*Cytherea pectinata, Lamk. An. s. Vert. v. 577. no. 63.*  
*Desh. Encycl. Meth. Vers. ii. 59; in Lamk. An. s. Vert. ed. 2. vi. 322. no. 63.*  
*Hanley. Descr. Cat. p. 107.*  
*Venus pectinee, Blainv. Malac. pl. 74. f. 4.*  
*Circe pectinata, Gray. Cat. Cyth. Anal. viii. 107. Sow. Thes. Conch. p. 649. pl. 137. f. 1-3.*  
*Cytherea Savignyi, Jonas. Zeits. fur. Malac. 1846 p. 65 Krauss, Sudafr. Moll. p. 9.*  
*Savigny, Descr. de l'Egypte, Coq. pl. 8. f. 17.*  
*Hab. Mare Rubrum; oceanus Indicus; insulae Philippinenses.*  
 (1664) *Circe Gibbia.*  
*C. testa subovali, postice oblique quadrata; area distincta, subtrigona, divaricatim costata tum costis noduliferis duabus aut tribus magnis radiantibus, ad umbones extensis; medio et antice costis noduliferis, magnis bifurcatis.*  
*Pectunculus, Lister. Conch. pl. 313. f. 149.*  
*Knorr, Vegin. vi. pl. 8. f. 3.*  
*Venus pectinata (ex parte), Chemn. Conch. vii. 28. pl. 39. f. 415, 416.*  
*Dillw. Cat. i. 198. no. 92.*  
*Schrot. Einl. iii. 144.*  
*Gmel. Syst. Nat. p. 3285.*  
*Venus, Encycl. Meth. pl. 271. f. 4.*  
*Cytherea Gibbia, Lamk. An. s. Vert. v. 577. no. 64.*



## MOLLUSCA.

*Desh. Encycl. Meth. Vers.* ii. 59; in *Lamk. An. s. Vert.* ed. 2. vi. 328. no. 64.  
*Sow. Genera of Shells*, f. 3.  
*Hanley, Descr. Cat.* p. 38. no. 42.  
*Reeve. Conch. Syst.* pl. 70. f. 5.  
*Menke. Moll. Nov. Holl.* p. 42. no. 244.

Var. *Cytherea ranella*, *Lamk. An. s. Vert.* v. 78.

*Desh. in Lamk. As. s. Vert.* ed 2 vi. 324. \*  
*Circe Gibbia*, *Gray, Cat. Cyth Anal.* viii. 307  
*Sow. Thes. Conch.* p. 649. pl. 137. f. 4-7.

*Hab.* Mare Rubrum; Australia; insulæ Philippinenses; oceanus Indicus.

(1665) *Circe arabica*.

*C. testa ovali*, subquadrata, subdepressa, obtuse subundulatum sulcata, albida, fasciis stramineis et punctis rubris, vel grisea, maculis rubescentibus seriatim dispositis biradiata, vel aurantiaca, fulvo radiata; intus purpureo et aurantio varie picta; latere antico brevi, declivi, lunula, subdistincta; latere postico oblongo, quadrato, margine dorsali paululum declivi, ad ligamentum vix recedente.

*An. Venus cordata?* *Forsk. Faun. Arab.* p. 123, no. 54.

*Venus arabica*, *Chemn. Conch.* xi. 224. pl. 201, f. 1968-1970.

*Venus*, No. 132, *Schrot, Einl.* iii. 194.

*Venus Calipyga* (ex parte), *Dillw. Cat.* i. 186.

*Savigny, Descr. D'Egypte*, pl. 9, f. 6.

*Cytherea arabica*, *Lamk. An. s. Vert.* v. 571. no. 40; ed. 2. vi. 312. no. 40.

*Delessert, Rec. de Coq.* pl. 9. f. 4.

*Hanley, Descr. Cat.* p. 101.

*Phil. Abbild. Conch.* p. 75. pl. 9. f. 5.

*Circe arabica*, *Gray, Cat. Cyth. Anal.* viii. 307.

*Sow. Thes. Conch.* p. 643. pl. 135. f. 165. 166, 168.

*Hab.* Mare Rubrum et Madagascariense.

(1666) *Circe abbreviata*.

*C. testa ovata*, antice retusa, rufa, albo-fasciata; striis transversis et in antico latere longitudinalibus obliquis sub-bifarctis.

*Cytherea abbreviata*, *Lamk. An. s. Vert.* ed. 2. vi. 322. no. 62.

*Deless. Rec. de Coq.* pl. 9. f. 1. a. d.

*Hanley, Descr. Cat.* p. 103.

*Sow. Thes. Conch.* p. 644. pl. 135. f. 170. 171

*Hab.* Oceanus Indicus (*Lamk.*)

*An.* *Circe arabica*, var. ?

(1667) *Circe callipyga*.

*C. testa ovata*, latiuscula, transversim inæqualiter striata, lineis angulatis picta, areola ovali. Testa ovata, latiuscula, parumper complanata, striis transversis inæqualibus: areola ovalis, impressa, striata; color testæ lutescens, pictus characteribus angulatis fuscis, umbonum niveus. (*Born.*)

## MOLLUSCA.

*Venus callipyga*, *Born. Mus.* p. 68. pl. 5. f. 1. (pro parte), *Lamk. An. s. Vert.* v. no. 61.

*Cytherea callipyga*, *Sow. jun. Thes. Conch.* p. 645. pl. 135. pl. 135. f. 164.

Var. *Cytherea adenensis*, *Phil. Abbild. Conch.* iii. 41. pl. 9. f. 6.

*Cytherea callipyga*, *Phil. loc. cit.* f. 3, 4.

*Cytherea elliptica*, *Sow. jun. Thes. loc. cit.* f. 174. 175.

*Hab.* Mare Rubrum.

(1668) *Circe Stutzeri*.

*C. testa ovato-rotundata*, subtrigona, depressa, crassa, transversim striata; albo-grisea lineis angularibus fulvis subreticulata umbonibus minimis, obtusis, oppositis approximatis; lunula?

*Venus Stutzeri*, *Donov. Nat. Repos.* iii. pl. 78, f. 1, 1824.

*Hab.* Mare Japonicum.

(1669) *Circe Cracherodii*.

*C. testa regulariter transversim ovata*, subæquilaterali, tumidula crassa, solida, antice late sulcata, in medio lævigata, postice striata, albo-grisea, maculis spadiceis pallidiore-nebulosis picta; umbonibus minimis, approximatis, lunula ovato-elongata, linea impressa circumdata; valvis intus pallide roseis, ad margines fusco maculatis.

*Circe Crecherodii*, *Gray, Cat. Cyth. Anal.* viii. 307.

*Hab.* Guinea.

(1670) *Circe lentiginosa*.

*C. testa ovali*, subventricosa, concentrice sulcata; sulcis subundulatis, fusca, vel pallide fulva, grisescente, maculis et lineis nigrescentibus præcipue ad margines picta, ad umbones purpurascente, intus griseo nebulata; umbonibus obtusis, lunula subcomplanata; area dorsali excavata.

*Venus lentiginosa*, *Chemn. Conch.* xi. 223, pl. 202, f. 1963, 1964.

*Cytherea Pfeifferi*, *Phil. Abbild.* pl. f. 1.

*Sow. Thes. Conch.* p. 644. pl. 135 f. 860-162,

*Circe liturata*, *Gray, Anal.* viii. 107.

*Hab.* Mare Rubrum; oceanus Indicus.

(1671) *Circe pulchra*.

*C. testa ovato-transversa* subæquilaterali anterieus obtusa, postice angustiore, tumida, solida irregulariter transversim striata, striis inæqualibus distantibus plicæformibus, striis longitudinalibus tenuissimis obsoletis decussantibus; albo-grisea, maculis duabus castaneis radiantibus, in medio separatis; valvis intus albo griseis in marginibus brunneis; impressione pallii brevissima, in medio valvarum posita simplici.

*Cytherea elegans*, *Sow. Thes. Conch.* p. 645. pl. 135. f. 163 (non *Koch*).

*Circe pulchra*, *Desh. Proc. Zool. Soc.* 1853.

*Hab.* Mare Rubrum. Coll. Cuming.

(1672) *Circe castrensis*.

*C. testa crassa*, rotundata, subdepressa, lævi, ad latere concentrice subsulcata; albida, lineis

## MOLLUSCA.

vel maculis angulatis plus minusve suffusis picta, nonnunquam griseo nebulata; latere antico breviusculo, rotundato lunula distincta, subtumida; latere postico subquadrato; umbonibus e margine dorsali elevatis; intus pallii impressione integra.

*Pectunculus depictus*, *Lister, Conch.* pl. 262. f. 98.

*Bonanni, Recreat.* pl. 2. 378.

*Favanne, Conch.* pl. 47. f. H.

*Chama optica, Rumph. Amb.* pl. 43. f. K.

*Petiver, Amb.* pl. 5. f. 2; pl. 18; f. C?

*D'Argenr. Conch.* pl. 21. f. M.

*Conch. Gault. Ind. Test.* pl. 82. f. H.

*Regenf. Conch.* pl. 1. f. 3; pl. 4. f. 41.

*Knorr. Vergn.* i. pl. 21. f. 5; ii. pl. 20. f. 2. iii. 4. f. 4; vi. pl. 6. f. 5. 6.

*Venus castrensis, Linn. Syst. Nat.* ed. 10. p. 687; ed. 12. p. 1132, no. 129; *Mus. Utr.* p. 501. no. 61.

*Born. Mus.* p. 66.

*Dillw. Cat.* i. 183, no. 58.

*Venus castrensis (ex parte), Chemn. Conch.* vi. 359. pl. 35. f. 367, 368, 374.

*Schrot. Einl.* iii. 128. plur. exclus. syn.

*Gmel.* p. 2273, no. 29.

*Venus australis, Chemn. Conch.* x. 355, pl. 171. f. 1668.

*Gmel.* p. 3282, no. 88.

*Venus Lorenziana, Chemn. Conch.* xi. 222. pl. 200. f. 1. 961. 1962.

*Dillw. Cat.* i. 184. no. 60.

*Venus Encycl.* pl. 278. f. 1.

*Martyn. Univers. Conch.* ii. pl. 141.

*Cytherea castrensis, Lamk. An. s. Vert.* v. 568 no. 8.

*Desh. Encycl. Meth. Vers.* ii. 57. no. 15. in *Lamk. An. s. Vert.* ed. 2. vi. 308. no. 31.

*Reeve. Conch. Syst.* i. pl. 71, f. 2.

*Hanley. Descr. Cat.* p. 99.

*Kuster. in Chemn.* ed. 2. p. 16. pl. 2. f. 3. pl. 12. f. 3-6.

*Circe castrensis, Gray. Cat. Cyth. Anal.* viii. 307.

*Cytherea, Sow. Thes. Conch.* p. 142, pl. 134, f. 151. 154.

*Hab. Oceanus Indicus et Chinensis atque Australis.*

(1673) *Circe fastigiata.*

C. testa C. castrensi simili sed ovali, postice attenuata, subacuminata; umbonibus parvulis; lunula subcomplanata, griseo angulatum variegata; intus flavicante; sinu pallii parvo, angusto, late triangulari.

*Cytherea fastigiata, Sow. Thes. Conch.* p. 643 pl. 135, f. 158, 159.

*Hab. Nova Hollandia. Sydney.*

(1674) *Circe tigrina.*

C. testa ovata, medio lævi, lateralibus transversim sulcata; alba, maculis fusco-nigris, sæ-

## MOLLUSCA.

pius triangulribus sparsis vel radiis formantibus; ano cordato, parvo, fusco.

*An. Chemn. Conch.* vi. t. 35. f. 374, 375?

*Valentyn, Amb. Bar.* pl. 15, f. 16.

*Cytherea tigrina, Lamk. An. s. Vert.* ed. 2. vi. 310, no. 34.

*Hanley, Descr. Cat.* pl. 100, in *Wood, Suppl.* pl. 15, f. 13.

*Cytherea tigrina, Sow. Thes. Conch.* pl. 643. pl. 135. f. 155, 156; an eadem species, f. 157?

*Hab. Oceanus Indicus; insulæ Moluccenses; Philippinenses, &c.*

(1675) *Circe sulcatina.*

C. testa trigona, rotundato, rufo-fuscescente albido radita; stariis transversis postice sulci, foribus, ano cordato; intus aurea.

*Venus castrensis, Var. Chemn. Conch.* vi. t. 35. f. 371. 372.

*Cytherea sulcatina, Lamk. An. s. Vert.* ed. 2. vi. 308. no. 29.

*Hanley, Descr. Cat.* p. 99; in *Wood, Suppl.* pl. 9. f. 13.

*Sow. Thes. Conch.* p. 641 pl. 134, f. 145. 164.

*Chione sulcatina, Gray. Anal.* viii. 205.

*Hab. Insulæ Philippinenses (Cuming).*

(1676) *Circe Sowerbyi, Desh.*

C. testa rotundato-trigona, turgida, solida subæquilaterali, transversim irregulariter striat., albo rubicante lineis numerosis angulosis transversalibus picta; umbonibus tumidiusculis; lunula diffuse circumscripta, in medio tumida; ligamento immerso; latere antico obtuso, lato, postico declivi, attenuato; valvis intus castaneis, antice posticeque albis; impressione pallii posterioris vix inflexa.

*Cytherea hebreæa, Sow. Thes. Conch.* p. 641. pl. 134, f. 143, 144, 148 (non *Lamk.*).

*Hab. Insulæ Ticao Philippinarum.*

(1677) *Circe picta.*

C. testa ovato-transversa, tumida, subcordato, postice subacuminata; lineis maculisve rufis aut spadiceis diversissime picta, intus luteola; lunula lata, ovata-cordata, plana.

*Pectunculus reticulatus, Lister Conch.* p. 259, f. 95.

*Venus castrensis, var., Chemn. Conch.* vi. 366 pl. 35. f. 380, 381.

*Venus, Encycl. Meth.* pl. 273. f. 2. 3.

*Venus ornata, Dillw. Cat.* i. 184. no. 61.

*Cytherea picta, Lamk. An. s. Vert.* v. 592, no. 33.

*Desh. Encycl. Meth. Vert.* ii. 57, no. 16; in *Lamk. An. s. Vert.* ed. 2. vi. 309, no. 33.

*Hanley. Descr. Cat.* p. 190.

*Circe picta, Gray. Cat. Cyth. Anal.* viii. 307,

*Cytherea ornata, var., Sow. Thes. Conch.* p. 642.



## MOLLUSCA.

*Hab.* Oceanus Indicus.

(1678) *Circe trimaculata*.

C. testa oblique cordata. superne transversim sulcata; castanea; natibus lævibus anoque violaceis; intus alba, trimaculata.

An Venus Phryne? *Gmel.* no. 21.

*Cytherea trimaculata*, *Lamk. An. s. Vert.* ed 2. vi. 813, no. 41.

*Hanley, Descr. Cat.* p. 101; in *Wood, Suppl.* pl. 10, f. 5?

*Callow. Cat.* p. 40. no. 109.

*Phillippi. Abbild. Conch.* pl. 5. f. 2.

*Sow. Thes. Conch.* p. 641. pl. 134. f. 146.

*Hab.* Oceanus Indicus; insulæ Philippinenses (*Cuming*).

(1679) *Circe Caliste*.

C. testa Ostriis transversis acutis antrorsum membranaceis, vulva brevior, ano inconspicuo.

Venus Caliste, *Spengler. Schort. Eint.* iii. 156, pl. 8. f. 8. 9.

*Gmel.* p. 3277. no 32.

*Circe Caliste*, *Gray. Cat. Cyth. Anal.* viii. 308,

*Hab.* Mare Rubrum.

"V. Guineensi affinis, testa anterieus exteriusque cærulescente, intus saturatius tincta, posterius ut plurimum sordide alba" (*Gmelin*).

An Arabica var.?

*Astarte. Syn. Crassina. Tridonta. Goodallia, rec.* 14 sp. fossil 200 sp.

*Sub-genus? Digitalia. rec?* also fossil.

*Crassatella. Syn. Ptychomya. Paphia, rec.* 30 sp. fossil 50 sp.

*Isocardia. Heart-cockle. Syn. Glossus Bucardium.*

*Pecchiolia, rec.* 5 sp. fossil 70 sp.

*Cypricardia. Syn. Trapezium. Libitina, rec.* 13, sp. fossil 60 sp.

*Sub-genera. ? Coralliophaga. rec.* 2 sp.

? *Cardilia. Syn. Hemicyclonosta, rec.* 2 sp. fossil, 2 sp.

*Cardita. Syn. Mytilicardia and Cardiocardita. Arcinella, rec.* 50 sp. fossil 100 sp.

*Cardita imbricata, Madras.*

*Sub-genus. Venericardia. recent.*

? *Verticordia. Syn. Hippagus, rec.* 2 sp. fossil 2 sp.

### SECTION B. SINU PALLIALA.

Respiratory Siphons long; pallial line sinuated.

Family XIV. Veneridæ.

Genera, Venus. *rec.* 176, sp. fossil 160 sp.

Venus dorsata.	Malacca
Venus.	Labuan.
Venus Tiara.	East Indies.
Venus cancellata.	Indian Ocean.
Venus paupercula.	Coromandel.
Venus Malabarica.	Malabar.
Venus Erycina.	Europe and Asia.

## MOLLUSCA.

Venus costata.	Ceylon.
Venus coaxans.	Ceylon.
Venus lusoria.	Amboyna.
Venus casta.	East Indies.
Venus Meretrix.	Indian Seas.
Venus opinia.	East Indies.
Venus triradiata.	Tranquebar.
Venus nebulosa.	Tranquebar.
Venus contemta.	Malabar.
Venus receus.	Coromandel.
Venus japonica.	Tranquebar.
Venus striata.	Nicobar Islands.
Venus castrensis.	Amboyna, &c.
Venus Lorenziana.	Ceylon.
Venus ornata.	Tranquebar.
Venus Phryne.	Southern Ocean.
Venus Meroe.	East Indies.
Venus fimbriata.	East Indies.
Venus reticulata.	Ceylon and N. S. Wales.
Venus Puerfera.	East Indies.
Venus crenulata.	East Indies.
Venus squamosa.	Amboyna.
Venus tigrina.	
Venus Sinensis.	China.
Venus prostrata.	Tranquebar.
Venus punctata.	Amboyna.
Venus species.	
Venus casina.	
Venus decussata and	
nine others.	
Venus sinuata.	Tranquebar.
Venus juvenilis.	Indian Seas.
Venus Histrio.	East Indies.
Venus pectinata.	Amboyna.
Venus discors.	China.
Venus dispar.	South Seas.
Venus equivocca.	East Indies.
Venus divaricata.	Ceylon.
Venus scripta.	Amboyna.
Venus gigantea.	
Venus literata.	Amboyna.
Venus rotundata.	Ceylon.
Venus monstrosa.	Nicobar Islands.
Venus fluminea.	China Fr. W.
Venus fluviatilis.	Canton Fr. W.
Venus similis.	China.
Venus kingii.	South Seas.
Venus aphrodinoides.	South Seas.
Venus lians.	China.
Venus cyprinoides.	Japan.
Venus costulata.	South Seas.
Venus pulchra.	South Seas.
Venus Damaoides.	East Indies.

(1680) *Venus verrucosa*.

V. testa inflata, subcordata, ponderosa, alborufescente, rufomaculata et triradiata, transversim rugosa, rugis multifariam lamellosis, ad spicem striis longitudinalibus decussata, antice posticeque divaricatim verrucosa; lunula ovato-cordata, impressa, longitudinaliter striata; marginibus crenulatis, intus alba vel pallide aurantia, postice violaceo maculata.

## MOLLUSCA.

- Pectunculus crassissimus*, *Lister, Conch.* pl. 284 f. 122 and pl. 285, *Da Costa, Brit. Conch.* pl. 12. f. 1.  
*Petiv. Gazoph.* pl. 93, f. 17.  
*Concha marina*, *Gualt. Ind. Test.* pl. 75. f. II.  
*D'Argenv. Conch.* pl. 28. f. Q.  
*La Cionisse, Adans. Seneg.* p. 216 pl. 16. f. 1.  
*Ginnonni, Op. post.* ii. 30 pl. 20. f. 137.  
*Encycl. Meth.* pl. 271. f. 5?  
*Favanne, Conch.* pl. 47. i. E. 9.  
*Venus verrucosa*, *Linn. Syst. Nat.* ed. 10. p. 665; ed. 12 p. 1130.  
*Born, Test. Mus.* p. 60, pl. 4. f. 7.  
*Chemn. Conch.* vi. 303. pl. 29. f. 299, 300.  
*Schort. Einl.* iii. 114.  
*Gmel.* p. 3269. no. 6.  
*Poli* (*Collista et Callistoderma*), *Test. Sicil.* ii. 90. pl. 21. f. 18, 19.  
*Oliv. Adriat.* p. 107. no. 1.  
*Donov. Brit. Shells*, ii. pl. 44.  
*Mont. Test. Brit.* p. 112.  
*Venus verrucosa*, *Maton and Rock. Linn. Trans.* viii. 78.  
*Dorset Cat.* p. 34. pl. 8. f. 1.  
*Dillw. Cat.* i. 163. no. 12.  
*Wood, Ind. Test.* pl. 7. f. 12.  
*Lamk. An. s. Vert.* v. 586. no. 7.  
*Pyraud, Cat. dess Moll. de Crose*, p. 48, no. 81.  
*Turt. Dith. Brit.* p. 141.  
*Flem. Brit. Anim.* p. 444.  
*Desh. Encycl. Meth. Vers.* iii. 4; *Exped. Soc. de Moree*, p. 99. no. 47.  
*Philippi, Enum. Moll. Sicil.* i. 43; ii. 34.  
*D'Orb. Moll. des Canar.* p. 106.  
*Krauss, Sudafr. Moll.* p. 10.  
*Hanley, Descr. Cat.* p. 110.  
*Sow. Conch. Man.* f. 119. a.  
*Desh. Traite. Elem. de Conch.* pl. 21. f. 1, 2.  
*Forbes and Hanley, Brit. Moll.* i. 401, pl. 24. f. 3.  
*Dosina verrucosa*, *Gray, Cat. Cyth. Anal.* viii. 308.  
*Venus dysera*, var. *Linn. Mus. Utr.* p. 498.  
*Venus Erycina*, *Penn. Brit. Zool.* iv. pl. 52. f. 48.  
*Junior. Venus Lemani*, *Payr. loc. cit.* p. 53. no. 91. pl. 1. f. 29-31.  
*Junior. Venus cancellata*, *Donov. Brit. Shells.* iv. pl. 115?  
*Mont. Test. Brit.* p. 574.  
*Turt. Dith. Brit.* p. 144. pl. 10. f. 3.  
*Flem. Brit. Anim.* p. 447.  
*Thorpe, Brit. Mar. Conch.* pl. 87.  
*Sow. jun. Thes. Conch.* p. 727. pl. 160. f. 182, 183.  
*Fossilis. Venus excentrica*, *Agassiz, Etudes Critiques.* p. 34. no. 4. pl. 5. f. 9-11.  
*Hab.* Oceanus Europæus; mare Mediterraneum; Insulæ Canarienses (*D'Orbigny*); Senegal (*Adanson*); Caput Bonæ Spei (*Krauss*).

## MOLLUSCA.

- (1681) *Venus foveolata*.  
*V.* testa ovato-transversa, inæquilaterali, lateraliter subcompressa, postice angustiore, candidissima, lamellis tenuibus transversis cincta, antice eminentioribus, ad umbones distantioribus et interstitis striatis; umbonibus minimis, subcordatis; lunula magna, ovato-cordata, impressa, in medio carinato-convexa: valvis intus candidissimis, dente laterali antico magis perspicuo; sinu pallii brevi, angulato, late aperto.  
*Venus foveolata*, *Sow. jun. Thes. Conch.* p. 730 pl. 154. f. 46.  
*Hab.* China; mare Martinicense. *Mus. Cuming.*  
(1682) *Venus puerpera*.  
*V.* testa magna, ponderosa, cordata, turgida, albo-flavescente, maculis irregularibus fuscis notata, postice fusca, apicibus violaceo breviter biradiatis, lamellis erectis brevibus transversalibus cincta, longitudinaliter tenue sulcata; labiis vulvæ plicatis incumbens; lunula cordiformi, impressa, lamellosa, in medio prominula; marginibus tenue crenulatis; valvis intus albidis seu croceis, in plerisque violaceo postice tinctis.  
*Pectunculus cancellatus*, *Lister. Conch.* pl. 326, f. 173.  
*Knorr. Vergn.* vi. pl. 10. f. 1.  
*Venus puerpera*, *Linn. Mant.* p. 545.  
*Chemn. Conch.* vi. 372. pl. 36. f. 388, 389.  
*Schrot. Einl.* iii. 152.  
*Gmel.* p. 3276 no. 23.  
*Encycl. Meth.* pl. 278. f. 1;  
*Dillw. Cat.* i. 188 (ex parte).  
*Lamk. An. s. Vert.* v. 584. no. 1. (exclus. var. 2).  
*Desh. in Lamk.* ed. 2 vi. 334. (exclus. var. 2).  
*Sow. Genera of Shells*, f. 1.  
*Reeve. Conch. Syst.* i. pl. 67. f. 1.  
*Hanley, Descr. Cat.* p. 109.  
*Sow. jun. Thes. Conch.* p. 703. pl. 152, f. 1.  
*Venus reticulata*, *Born. Test. Mus.* p. 69.  
*Wood, Ind. Test.* pl. 8. f. 66.  
*Dosina puerpera*, *Gray, Cat. Cyth. Anal.* viii. 308.  
*Hab.* Oceanus Indicus; insulæ Borbonica et Madagascariensis.  
(1683) *Venus lacerata*.  
*V.* testa Veneri puerperæ affini, minus autem ventricosa et margini ventrali posticoque magis arcuatis; margine ligamentali subrecto et minime declivi; lamellis concentricis confertioribus et postice asperimis; superficie externa albida, lineis ferrugineis aut brunneis angulatum strigata; extremitate postica intus extusque immaculata.  
*Venus lacerata*, *Hanley, Ind. Test. Suppl.* pl. 16. f. 23, *App; Proc. Zool. Soc.* 1844, p. 161; *Sow. jun. Thes. Conch.* p. 704, pl. 152. f. 3, 4.  
*Hab.* Amboina; insulæ Moluccarum.  
(1684) *Venus magnifica*.  
*V.* testa suborbiculari, subcordata, tumida, solidissima, valde inæquilaterali; margines versus



purpureo tincta, umbones versus albida, brunneo sparsim maculata; lineis concentricis, sulcisque radiantibus decussata; lineis antice undatis et paulo elevatis, postice obsoletis, medio planulatis et sursum speciantibus; sulcis frequentibus profundis; margine ventrali arcuato, intusque crenato; dorsali, antice convexo et declivi, postice convexo et vix declivi; latere postico majore obtuso; natibus maxime curvatis; pube lunulaque prominente, cordiformi, livido-purpureis; ligamento infosso; superficie interna albida, immaculata; dentibus ut in Venere puerpera.

Venus magnifica, *Hanley, Proc. Zool. Soc.* 1845, p. 21.

*Sow. jun. Thes. Conch.* p. 704, pl. 152, f. 5.

*Hab.* Insula Ticao, Philippinarum.

(1685) *Venus Listeri*.

V. testa ovato-cordiformi, tumida, solidiuscula inaequilaterali; cingulis transversalibus foliaceis crispis erectis distantibus cincta, longitudinaliter dense striata; latere antico brevi, obtuso, angusto, postico lato, truncato, flavescente fusco pallido nebulata, aliquantisper immaculata; intus alba, postice violaceo tincta; lunula cordata, impressa, lamellosa, in medio carinata.

Venus, *Encycl. Meth.* pl. 278, f. 2.

*Knorr. Vergn.* vi. pl. 10, f. 3. junior?

*Favanne, Conch.* pl. 46, f. B. 1.

Venus puerpera (ex parte), *Dillw. Cat.* i. 183, no. 63.

Venus puerpera (var. 2), *Lamk. An. s. Vert.* v. 585.

*Desh. in Lamk. An. s. Vert.* ed. 2 vi. 335.

*Wood, Ind. Test.* pl. 8, f. 67.

Dosina Listeri, *Gray, Cat. Cyth. Anal.* viii. 308.

Venus Listeri, *Hanley, Descr. Cat.* p. 110.

*Sow. jun. Thes. Conch.* p. 705, f. 8. (alterix exclus).

*Hab.* Insulae Philippinenses (*Cuming*) Australia.

(1686) *Venus Chemnitzii*.

V. testa rhombeo-cordata, crassa, ventricosa, valde inaequilaterali, albida, brunneo radiatum maculata et strigata, radiatum costellata, concentricae lamellifera; lamellis numerosis, brevissimis, undique crispis; costellis angustis confertissimis; margine ventrali convexo, intusque crenulato; dorsali postico, subrecto et minime declivi; latere postico superne angulato; antico brevi, attenuato, rotundato; lunula fusca, cordata; ligamento angusto, infosso; superficie interna albida, immaculata.

Venus reticulata (ex parte), *Chemn. Conch.* vi. pl. 36, f. 384.

*Hanley, Proc. Zool. Soc.* 1844, p. 160.

*Wood. Suppl. App.* pl. 16, f. 20.

*Hab.* Insulae Philippinensis.

(1687) *Venus reticulata*.

V. testa crassa, tumida, oblique cordata, alba ex fusco radiata et maculata; striis longitudina-

libus minoribus et transversis crassioribus majoribus, solide arcuato-dentatis, reflexis; marginibus integris; labiis incumbentibus; lunula cordiformi, impressa, longitudinaliter plicato-rugosa intus alba; cardine croceo.

*Pectunculus gravis, Lister. Conch.* pl. 336, f. 172.

*Concha cordiformis, Gualt. Ind. Test.* pl. 83, f. F.

Venus reticulata, *Linn. Syst. Nat.* ed. 10. p. 687; ed. 12. p. 1133. plurib. syn. exclus. *Mus. Utr.* ii. 503. no. 64.

*Chemn. Conch.* vi. 367, pl. 36, f. 382-384.

*Schrot. Eintl.* iii. 134.

*Gmel.* p. 3275, no. 26.

Venus, *Encycl. Meth.* pl. 276, f. 4.

Venus reticulata, *Dillw. Cat.* i. 188, no. 67, excl. plur. synon.

Venus Corbis, *Lamk. An. s. Vert.* v. 585, no. 4.

*Desh.* ed. 2. vi. 337.

Dosina reticulata, *Gray, Cat. Cyth. Anal.* viii. 308.

Venus reticulata, *Hanley, Descr. Cat.* p. 110; in *Wood. Suppl.* pl. 16, f. 9.

*Sow. jun. Thes. Conch.* p. 706, pl. 153, f. 11-13.

*Hab.* Mere Rubrum; oceanus Indicus; insulae Marquises dictae; Fretus Torres dictus; insulae Philippinensis (*Cuming*) mare Madagascariense.

(1688) *Venus monilifera*.

V. testa subcompressa, subquadrata, fulva, fusco-rubescens radiatum maculata, et postice angulatum sublineata; costellis moniliferis radiantibus et costellis concentricis crassiusculis crenulatis decussata; margine dorsali elevato, rectiusculo; latere antico breviusculo, subquadrato, medio depresso; latere postico truncato, subangulato; cardine dentibus aurantiis.

Venus monilifera, *Sow. jun. Thes. Conch.* p. 707, pl. 153, f. 19.

*Hab.* Insula Mindoro, Philippinarum (*Cuming*).

(1689) *Venus Sowerbyi*.

V. testa ovato-subquadrata, inaequilaterali, turgida, cordiformi, crassissima, ponderosa, alba, rufo pallido quadriradiata, antice obtusa, brevi, postice latiore, oblique et late truncata, longitudinaliter tenue et regulariter sulcata, lamellis brevibus, crassis, erectis irregulariter dispositis, crenulatis postice latioribus tenuioribusque decussata; umbonibus magnis, cordatis; lunula magna, plana, impressa, rufo-purpurascens; area dorsali elongato-lanceolata, in valva sinistra maculis magnis castaneis notata; vulvis intus albo pallide flavicantibus.

Venus Sowerbyi, *Desh. Proc. Zool. Soc.* 1853.

*Hab.* Insulae Philippinenses. Coll. *Cuming*.

(1690) *Venus crebrisulca*.

V. testa cordato-rotundata, albida rufo-maculata, sulcis transversis crebris obtusis, ad latus posticum eminentioribus, sublamellosis.

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*Encycl.* pl. 276. f. 1. a. b.

*Venus crebriculca*, *Lamk. An. s. Vert.* v. 587. no. 10. (exclus. varietate); ed. 2. vi. p. 340.

*Hanley, Descr. Cat.* p. 111.

*Hab.* Oceanus Indicus.

(1691) *Anomalocardia squamosa*.

A. testa cordato-trigona, gibba, postice attenuata, angulata vel subrostrata, flavida, aliquantisper ochracea, sulcis longitudinalibus aliquando geminatis et transversalibus decussata, squamosa; lunula magna, cordiformi, fusciscente; cardine violaceo maculato.

An. Chama flexuosa? *Rumph. Amb.* pl. 44. f. M?

*Pectunculus parvus*, *Petive. Amb.* pl. 18, f. 17.

*Coucha cordiformis*, *Gualt, Ind. Test.* pl. 83, f. G.

*Venus squamosa*, *Linn. Syst. Nat.* ed. 10. p. 688; ed. 12, p. 1133.

*Chemn. Conch.* vi. 332, pl. 31, f. 335.

*Schort. Einl.* iii. 135. no. 24.

*Gmel.* p. 3275, no. 27.

*Dillw. Cat.* i. 190, no. 72.

*Wood. Ind. Test.* pl. 8. f. 71.

*Desh. in Lamk.* ed. 2. vi. 326.

*Hanley, Descr. Cat.* p. 115.

*Sow. jun. Thes. Conch.* p. 716. pl. 156. f. 83. 84.

*Cytherea squamosa*, *Lamk. An. s. Vert.* v. 580. no. 75.

*Hab.* Oceanus, Indicus (*Chemn., Lamk.*).

? *Volupia rugosa*. fossil.

*Saxidomus Nuttali*. rec. 8 sp.

*Cytherea*, *Syn. Meretrix*, *Dione*, rec. 113. sp. fossil. 80 sp.

*Cytherea aurantia*. Mazatlan.

*Cytherea impudica*. Labuan.

*Cytherea impudica*, variety.

*Cytherea Erycina*. Ceylon.

*Cytherea rosea*. Mazatlan.

*Cytherea festina*. China.

(1692) *Meretrix Ovum*.

M. testa ovata, solidissima, transversa, subæquilaterali, ventricosa, nitida, lævigata, albida, epidermide fulva indurata; marginibus integris; latere antico rotundato, postico obtuse subangulato, suprene glauco-cinereo; natibus oppositis, sæpe erosis; lunula obsoleta; superficie interna albida, postice livido-purpurascens infecta; dente postico leviter crenulato; sinu palliari vix albo.

*Cytherea Ovum*, *Hanley. Ind. Test. Sup.* pl. 15, f. 21, *Proc. Zool. Soc.* (1845) p. 21.

*Sow. Thes. Conch.* p. 621, pl. 129, f. 49.

*Hab.* Madras.

(1693) *Meretrix Casta*.

M. testa cordato-ovata, gibba, crassa, alba; pube anoque ovatis, convexis, glabrescentibus; intus violaceo maculata, extus epidermide fuscescente vestita; umbonibus tumidis, oppositis livide violascentibus; nymphæ basis internal

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tenuissime corrugata; pallii impressione simplici, postice, latiore.

*Venus Casta*, *Chemn. Conch.* t. vi. p. 349. pl. 33. f. 346.

*Gmel.* p. 3278, no. 42.

*Dillw. Cat.* t. i. p. 179, no. 47.

*Wood. Ind. Test.* pl. 7, f. 46.

*Cytherea casta*, *Lamk. An. s. Vert.* ed. 2 t. vi. p. 301. no. 10.

*Hanley. Descr. Cat.* p. 97.

*Kuster. in. Chemn. Conch.* ed. 2 p. 14 pl. 3. f. 3.

*Sowerby. Thes. Conch.* p. 621. pl. 129. f. 43. 44, 46.

*Gray. Cat. Cyth. Analyst.* t. viii. p. 303.

*Hab.* India, in insula Ceylonensi.

(1694) *Meretrix Lusoria*.

M. testis ovato-cordata, subtrigona, lævi, alba zonis castaneis medio interruptis; dente cardinali antico bifido; sinu pallii triangulari brevi lato, semiovato; umbonibus parvis obliquis; lunula elongato, ovata; nymphis brevibus, angustis, rugis brevibus notatis; ligamento costula extus circumdato.

*Meretrix Lusoria*, *Rumph. Amb.* pl. 42. f. G;

*Petiver. Amb.* pl. 18. f. 20?

*Encycl. Meth.* pl. 270. f. 1.

*Venus Lusoria*, Japonica, *Chemn. Conch.* t. vi. p. 337, pl. 32. f. 346.

*Venus lusoria*, var. A. *Dillw. Cat.* t. i. p. 177, no. 44.

*Wood. Ind. Test.* pl. 7. f. 43.

*Venus Chione*, var. *Gmel.* p. 3272, no. 16.

*Cytherea lusoria*, *Lamk. An. s. Vert.* t. v. p. 561. no. 0.

*Desh. in Lamk. An. s. Vert.* t. vi. p. 297.

*Hanley. Descr. Cat.* p. 96.

*Kuster. Chemn.* 2, ed. Veneracea, p. 8. pl. 9. f. 6.

*Sowerby. Thes. Conch.* p. 620, pl. 128, f. 40-42?

Testa majore; *Meretrix formosa*, *Sow. jun. Thes. Conch.* p. 620, pl. 129, f. 47.

*Hab.* Oceanus Indo-Chinensis.

(1695) *Meretrix petechialis*.

M. testa ovato-cordata, tumida, lævi, albo-glaucescente, maculis fulvis, punctiformibus, subsparis; latere postico angulato; intus candida; dente lunari maximo, trigono-pyramidalis, apice acuto; nymphæ rugis numerosis, tenuibus, parallelis; impressione pallii, margine remota, sinu lato, arcuato, brevi.

*Meretrix petechialis*, *Encycl. Meth.* pl. 268, f. 5. 6.

*Cytherea petechialis*, *Lamk. An. s. Vert.* t. v. p. 561.

*Desh. in Lamk. An. s. Vert.* 2, ed. t. vi. p. 299.

*Sowerby, Genera of Shells*, f. 1.

*Hanley, Descr. Cat.* p. 96; in *Wood. Sup.* pl. 15, f. 9.

*Reeve, Conch. System.* t. i. pl. 69 and 70. f. 1.



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*Sowerby, Thes. Conch.* p. 619. pl. 129, f. 51.  
*Hab.* China.

(1696) *Meretrix impudica*.

*M.* testa ovato-subtrigona, cordata, crassa, inaequilaterali, postice angulata, alba, sub-epidermide flavo aliquantisper subradiata, vet. maculis fuscis ad umbones notata, vulva fusco-cærulescente; umbonibus tumidis obliquis; lunula nulla; intus alba, postice fusco maculata; cardine angusto, in valva sinistra bidentato, nymphis brevibus, regulariter corrugato-plicatis; sinu pallii latissimo, semicirculari.

*Venus Meretrix*, var., *Chemn. Conch.* t. vi. p. 352, pl. 33. f. 347, 348.

*Cytherea impudica*, *Lamk. An. s. Vert.* t. v. p. 561, no. 3.

*Hanley, Descr. Cat.* p. 96; in *Wood, Ind. Sup.* pl. 11, f. 10?

*Kuster in Chemn. C. C.* 2, ed. p. 8. pl. 3. f. 4. 5.

Var. testa majore, latere postico minus angulato.

*Cytherea meretrix*, *Lamk. An. s. Vert.* t. v. p. 562, no. 6; 2. ed. p. 300, no. 6.

*Delessert, Rec. de Cog.* pl. 3. f. 1.

*Anton. Vert. Conch.* p. 7. no. 241.

*Hanley, Descr. Cat.* p. 96; in *Wood, Sup.* pl. 15. f. 8.

*Gray. Cat. Cyth. Anal.* t. viii. p. 308?

*Sow. Thes. Conch.* p. 619, f. 48, 49.

*Hab.* Oceanus Chinensis; insulae Philippinae.

(1697) *Meretrix Morphina*.

*M.* testa trigona-rotundata, laevi, grisea; radiis nullis aut binis fuscis, imperfectis; vulva fusco-cærulescente; ano ovato; intus albo-flavescente, postice fusco maculata; margine interno cardinis recto; sinu pallii brevi, vex inflexo; dentibus inaequalibus, antico brevior.

*Meretrix Morphina*, *Encycl. Meth.* pl. 266, f. 3? an *Venus pinguis*?

*Cytherea Morphina*, *Lamk. An. s. Vert.* t. v. p. 562, no. 8; 2. ed. t. vi. p. 300, no. 8.

*Hanley, Descr. Cat.* p. 96.

*Sow. Thes. Conch.* p. 620, pl. 129, f. 59, 60?

*Hab.* Mare Chinense.

Si. species Lamarckii figura Encyclopædiæ fideliter depingitur, illa quæ datur a Sowerbyo non eadem est.

In synonymia V. Morphinae introducit Lamarckius Venerem triradiatam Chemnitzii hac testatamen generis Cytherearum non est, sed Veneris opimæ Lamarckii varietas (*Venus pinguis*, *Chemn.*).

Eadem figura Encyclopædiæ Lamarckio bis citatur, primo in V. Morphinae synonymia, secundo in sua Venere opima; tamen impossibile est, ab eadem figura duæ species distinctissimæ representari.

(1698) *Meretrix graphica*.

*M.* testa trigono-rotundata laevi, grisea fusco-radiata aut lineolis flexuosis picta; vulva ovoli, glaucina; ano oblongo,

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*Meretrix graphica*, *Encycl. Meth.* pl. 266, f. 5. a. b.? an *Venus pinguis*?

*Cytherea graphica*, *Lamk. An. s. Vert.* t. v. p. 562, no. 7; 2. ed. t. vi. p. 300, no. 7.

*Hanley, Descr. Cat.* p. 96; in *Wood, Sup.* pl. 15, f. 11.

*Hab.* Oceanus Indicus; Sumatrensis.

(1699) *Meretrix castanea*.

*M.* testa cordato-trigona, laevi, crassa fusco-castanea; valva cæruleo nigrescente; angulis lateris postici obtusis; sinu pallii brevissimo, lato, arcuato; cardini angusto, tridentato, dente laterali compresso, triangulari, acuto; nymphæ basis interna profunde rugoso-granulosa, umbonibus brevibus obliquis; valvis intus albis, in latere, postico violaceo maculatis

*Meretrix castanea*, *Encycl. Meth.* pl. 269, f. 2. a. b.

*Venus Meretrix*, var. *Chemn. Conch.* t. vi. p. 352, f. 351.

*Wood, Ind. Test.* pl. 7, f. 47.

*Cytherea meretrix*, var. *Anton. Vert. Conch.* p. 7, no. 245.

*Cytherea castanea*, *Lamk. An. s. Vert.* t. v. p. 561.

*Desh. in Lamk. An. s. Vert.* 2, ed. t. vi. p. 299.

*Kuster. in Chemn.* 2, ed. p. 8, pl. 3, f. 9.

*Gray, Cat. Cyth. Anal.* t. viii. p. 303.

*Hanley, Descr. Cat.* p. 96.

*Potiez. et Mich. Galerie. de Douai.* p. 229.

*Cytherea*, *impudica*, var. *Sow. Thes. Conch.* p. 621.

Var. Testa albo flavida latere postico fusco.

*Hab.* Oceanus Chinensis.

(1700) *Meretrix zonaria*.

*M.* testa trigona, laevi, albide, lineis rugis angulato-flexuosis zonata; vulva planulata, fulvo scripta; lunula elongato-ovata, linea impressa circumscripta, intus alba, postice violaceo maculata; sinu pallii lato, brevi, subsemicirculari; umbonibus parvis, oppositis, obliquis; nympharum rugis nullis.

*Venus lusoria japonica variegata*, *Chemn. Conch.* t. vi. p. 347. pl. 33, f. 344.

*D'Argen. Conch.* pl. 21. f. F. ?

*Venus Chioni*, var. *Gmel.* p. 3272.

*Venus lusoria*, var. *B. Dillw. Cat.* t. i. p. 178.

*Cytherea zonaria*, *Lamk. An. s. Vert.* t. v. p. 562, no. 5.

*Anton, Verz. Conch.* p. 7. no. 239.

*Gray. Cat. Cyth. Anal.* t. viii. p. 303.

*Hanley, Descr. Cat.* p. 96; in *Wood, Sup.* pl. 15, f. 10.

*Sow. Thes. Conch.* p. 623. pl. 129, f. 53, 54.

*Hab.* Mare Chinense et Japonicum.

(1701) *Meretrix Lamarckii*.

*M.* testa ovato-trigona, transversa, inaequilaterali, lateraliter depressiuscula, tævigata, fulva vel rufo-fuscescente, aliquantisper pallide radiata; latere antico obtuso, postico acuminato, angulato, umbonibus minimis, acutis, oppositis; lunula

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elongato-lanceolata, inter, valvas rimosa in medio prominente; sinu pallii, lato paulo profundiore quam in aliis speciebus.

*Cythera morphina*, Sow. jun. (non Lamk.)  
*Thes. Conch.* p. 620, pl. 129, f. 59, 60.

*Hab.* Mare Chinense (Cuming).

An eadem junior *Meretrix tenuis*, Gray?

III. *Testa trigona, transversim sulcata.*

(1702) *Meretrix Philippinarum.*

M. testa cordata, inaequilaterali, ventricosa, crassiuscula, pallide livida, radiis et lineis angulatum flexuosis, saturatioribus variegato, concentricè costellata; costellis convexis, confertis; interstitiis laevigatis; lunula brevi, cordiformi, alba, rima lividopurpurascens; margine ventrali integro, arcuato superficie interna albida, macula livida sub umbonibus notata.

*Cytherea Philippinarum*, Hanley, *Proc. Zool. Soc.* (1844) 110. Wood, *Index Test. Sup.* pl. 19, f. 36.

Sow. *Thes. Conch.* p. 627, pl. 136, f. 176.

*Hab.* Insulae Philippinae (Cuming).

(1703) *Meretrix lyrata.*

M. testa ovali-subtrigona, crassa, ventricosa, fulvo-cinerascente, concentricè subundatim sulcata; latere postico subangulato, fusco; lunula vix distincta.

*Meretrix lyrata*, Sow. *Thes. Conch.* p. 621, pl. 129, f. 61.

*Hab.* Insulae Philippinae.

(1704) *Meretrix grata.*

M. testa minima, ovato-trigona, depressiuscula, inaequilaterali, nitidissima, late profundeque transversim sulcata; sulcis regularibus, rotundatis, interstitiis subaequalibus separatis, simplicibus, rubescentibus, interstitiis pallide luteis; umbonibus acutis, parvis, angustis, elatis; lunula plana, ovato-angusta, elongata livida; area planulata, laevigata; valvis intus albis, macula angusta castanea in margine postico; sinu pallii latissimo, semicirculari.

*Meretrix grata*, Desh. *Proc. Zool. Soc.* 1853.

*Hab.* Mare Chinense. Coll. Cuming.

(1705) *Dione umbonella.*

D. testa cordata, tumida, inaequilaterali, basi purpurascens, superne alba, postico latere laevi, antico transverse sulcato; umbonibus tessellatis.

*Cytherea umbonella*, Lamk. *An. s. Vert.* ed. 2, vi. 319, no. 55.

Hanley, *Descr. Cat.* p. 102.

Catlow, *Cat.* p. 40, no. 112.

Sow. *Thes. Conch.* p. 622, pl. 130, f. 63-66.

*C. nivea*, Hanley, *Sp. of Shells*, p. 97.

*Hab.* Mare Rubrum et Brasiliense.

(1706) *Dione maculata.*

D. testa D. Chioni simili, sed antice elongatiuscula, prope lunulam magis excavata, postice subacuminata, subangulata; lunula tumida.

Bonanni, *Observat. f.* 7.

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*Knorr, Vergn.* v. pl. 20, f. 4.

*Pavanne, Conch.* pl. 46, f. F. 1.

*Chama, Gualt. Ind. Test.* pl. 86, f. 1.

*D'Argemv.* pl. 21, f. H.

*Pectunculus maculatus*, Lister. *Conch.* p. 270, f. 106.

*Habenstreit, Mus. Richt.* p. 283.

*Regenfuss, Choix de Coq.* pl. 8, f. 16.

Le Jouret, *Adans. Voy. au Seneg.* 230, pl. 17, f. 15.

*Venus maculata*, Linn. *Syst. Nat.* ed. 10, p. 686; ed. 12, p. 1133; *Mus. Ulric.* p. 500, no. 59.

*Born. Test. Mus.* p. 64.

*Gronov. Zoophyl.* p. 29, no. 1146.

*Chemn. Conch.* vi. 345, pl. 33, f. 345.

*Schrot. Einl.* iii. 125.

*Gmel.* p. 3272, no. 17.

*Dillw. Cat.* i. 1788.

*Venus Chione*, var, *Kammerer, Rudols.* p. 205.

*Encycl. Meth.* pl. 265, f. 4.

*Cytherea maculata*, Lamk. *An. s. Vert.* v. 566, ed. 2, vi. 30, no. 23.

*Hab.* Mare Antillarum; Brasilia; littus Floridarum Oceanus Pacificus (Cuming); Guinea (Regenfuss); littus Senegalense (Adanson); insulae Sandwichienses.

(1707) *Dione squalida.*

D. testa ovato-subcordata, crassiuscula, laevi, pallide fusca, nonnunquam maculis irregularibus saturatioribus; epidermide fusca; latere postico longiore, prope partem ventralem subacuminato.

*Cytherea squalida*, Sow. *Proc. Zool. Soc.* 1835, p. 23.

Hanley, *Descr. Cat.* p. 104; in Wood, *Sup.* pl. 138, 40.

Sow. *Thes. Conch.* p. 629, pl. 131, f. 87, 88, 89.

*Chione squalida*, Gray, *Cat. Cyth. Anal.* viii. 306, 1838.

*Cytherea biradiata*, Sow. *Beechey's Voy.* pl.

*Venus squalida*, D'Orb. *Voy. en Amer. Moll.* p. 565.

Testa junior: *Cytherea elegans*, Koch in *Phil. Abbild. Conch.* i. 150, pl. 1, f. 4.

*Hab.* Sancta Helena: California; insulae Philippinae.

(1708) *Dione Hagenowi.*

D. testa ovata, oblique subcordata, laevi, nitida, concentricè obsolete plicata, fusca subradiata, radiis 2-3 latioribus interruptis rufo-castaneis ornata; umbonibus tumidis, concentricè eleganterque sulcatis lunula excavata, cordato-lanceolata; area utrinque castaneo-maculata.

*Cytherea Hagenowi*, Dunker, *Zeits. fur Malak.* 1848, p. 184, no. 17.

*Cytherea spathulata*, Sow. jun. *Thes. Conch.* p. 625, pl. 131, f. 78, 79.

*Hab.* Mare Rubrum.

*Chione affinis* ad latus posticum magis at-



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tenuata; intus alba; cicatriculæ musculares flavo tinctæ.

### (1709) *Dione piperita*.

D. testa lubrica, parva, ovali, subdepressa, pallide fulva, griseo obscure radiata, maculis nigrescentibus parvis angulatis sparsa; latere antico brevi, obscure sulcato, postico subacuminato; lunula distincta, ovata, carneola; area parumper excavata, lineis rubris liturata.

*Cytherea piperita*, *Sow. Thes. Conch.* p. 625 pl. 136. f. 175.

*Hab.* Insula Burias Philippinarum. Coll. Cuming.

### (1710) *Dione Chinensis*.

D. testa subovali, subdepressa, dimidiatim sulcata, alba, ruforadiata et maculata; margine dorsali albo, elevato; lunula impressa, rubra; latere postico subacuminato, intus pallide flavida; sinu pallii lato, profundo, ut in *Dione Chione*.

*Venus Chinensis*, *Chemn. Conch.* xi. 227, pl. 202. f. 1976.

*Venus pacifica*, *Dillw. Cat.* i. 175. no. 40.

*Cytherea Erycina*, var. *Lamk. An. s. Vert.* v. 564.

*Desh. in Lamk. An. s. Vert.* ed. 2. vi. 303.

*Cytherea Sinensis*, *Sow. Thes. Conch.* p. 624. pl. 131. f. 79. 80.

Var. Testa latior, alba, postice uniradiata, intus alba.

*Hab.* Mare Chinense; Nova Hollandia.

### (1711) *Dione florida*.

D. testa ovato-transversa, compressiuscula extremitatibus obtusa, alba, spadiceo inæqualiter radiata, maculis minimis pallidioribus notata, transversim et regulariter sulcata; sulcis latis, planulatis, antice profundioribus, postice aliquantisper evanescentibus; lunula ovato-cordata, spadicea vel alba, aut lineolis, rubescentibus variegata area excavata, lineolis undulatis, numerosis, rubescentibus ornata intus in fornice alba, postice et ad margines profunde violacea.

*Hab.* mare Rubrum; Mazambique, Madagascar. (Australia, *Lamk*).

### (1712) *Dione grata*.

D. testa transversim ovata, inæquilaterali, inflata, suboviformi, flava longitudinaliter violaceo-fuscescente radiata, transversim regulariter sulcata, sulcis regularibus, approximatis, depressis umbonibus tumidis, obliquis lunula magna, cordata, roseo-purpurascens area paululum excavata, lineis rubris distantibus flexuosis; valvis intus postice violaceis.

*Cytherea pectoralis*, *Sow.* (non. *Lamk.*) *Thes. Conch.* p. 625. pl. 130. f. 75.

*Hab.* Insulæ Philippinæ (*Cuming*).

### (1713) *Dione Erycina*.

D. testa ovali, crassa, concentrice planulatis sulcata, medio fusca, ad margines aurantia, prope marginem dorsalem fusco, et

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albo maculata, omnino fusco et albo interruptim radiata; latere antico brevi lunula distincta, aurantia.

*Pectunculus lævis*, *Lister. Conch.* pl. 268. f. 104.

*Knorr, Vergn.* iv. pl. 3. f. 5.

*Venus Erycina*, *Linn. Syst. Nat.* ed. 10. p. 686; ed. 12. p. 1131. no. 122.

*Venus Erycina*, *Lavanne, Conch.* pl. 46. f. F. 2.

*Encycl. Meth.* pl. 264. f. 2.

*Schorf Einl.* iii. 120.

*Gmel.* p. 3271. no. 13.

*Dillw. Cat.* i. 175. no. 38.

*Wood, Ind. Test.* pl. 7. f. 38.

*Cytherea Erycina*, *Lamk. An. s. Vert.* v. 564.

*Desh. Encycl. Meth. Vers.* ii. 55. no. 9; in *Lamk.* ed. 2. vi. 303, no. 14.

*Reeve, Conch. Syst.* pl. 71, f. 3.

*Hanley, Descr. Cat.* p. 97.

*Sow. Thes. Conch.* p. 673. pl. 130. f. 59.

*Chione Erycina*, *Gray. Cat. Cyth. Anal.* viii. 305.

*Hab.* Oceanus Indicus et Chinensis.

### (1714) *Dione costata*.

D. testa transversim ovata, nitida, alba, spadiceo biradiata et venulis rufescentibus sparsis variegata, transversim regulariter costata, costis, glabris convexis latioribus; vulva lanceolata; lunula cordiformi, impressa

*Venus costata*, *Chemn. Conch.* xi. 226. pl. 202. f. 1975

*Dillw. Cat.* i. 175. no. 39.

*Wood, Ind. Test.* pl. 7. f. 39.

*Hanley, Descr. Cat.* p. 106.

*Sow. Thes. Conch.* p. 623. pl. 130, f. 70, 71.

*Hab.* Ceylon (*Chemnitz*); Manilla (*Cuming*); Nova Holland ad Flumen Cygnorum.

### (1715) *Dione multiradiata*.

D. testa ovato-transversa, inæquilaterali, turgidula, antice obtusa, postice angustiore, transversim in latere antico obsolete sulcata, nitida, rufa, fasciis transversis albicantibus interrupta, longitudinaliter fusco multiradiata, radiis pluribus angustis; lunula angusta, aurantia lineis rubescentibus undulatis circumdata; intus alba, marginibus croceis.

*Cytherea multiradiata*, *Sow. Thes. Conch.* p. 623. pl. 130. f. 76.

*Hab.* Sinus Manillensis.

### (1716) *Dione lilacina*.

D. testa ovato-transversa, turgidula, inæquilaterali, utrinque obtusa, fulva, obscure radiata, transversim regulariter sulcata; lunula ovato-lanceolata, lævigata, rubescente; valvis intus albis, utraque extremitate pallide violaceis.

*Venus Erycina*, var., *Chemn. Conch.* vi. 334. pl. 32. f. 338, 339.

*Venus, Encycl. Meth.* pl. 264. f. 3.

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*Cytherea lilacina*, Lamk. *An. s. Vert.* v. 564.  
*Desh. Encycl. Meth. Vers.* ii. 55. no. 10 ;  
 in Lamk. *An. s. Vert.* ed. 2. vi. 303.

Hanley, *Descr. Cat.* p. 98 ; in Wood. *Ind. Test. Suppl.* pl. 15. f. 12.

Sow. *Thes. Conch.* p. 626. pl. 130. f. 74.

*Chione lilacina*, Gray, *Anal.* viii. 305.

*Hab.* Oceanus Indicus.

(1717) *Dione læta*.

D. testa inflata, subrotundata, lævi albida, fasciis fulvis interruptim radiata intus rosea ; latere postico rotundatim subquadrato, margine dorsali inflato, margine ventrali antice elevato ; latere antico brevissimo, carina una angulato ; lunula distincta, subexcavata.

*Chama æquilatera*, Gualt. *Ind.* pl. 75. f. M?

Knorr, *Vergn.* iv. pl. 24. f. 2. ?

*Venus læta*, Linn. *Syst. Nat.* ed. 10. p. 686 ; ed. 12. p. 1132. no. 128.

Chem. *Conch.* vi. 354 pl. 34. f. 353. 354.

Schrot. *Eint.* iii. 127, pl. 8 f. 7 ? loc. cit. p. 162, no. 21.

Gmel. p. 3273, no. 19 ?

Dillw. *Cat.* i. 180, no. 50.

*Venus affinis*, Gmel. p. 3273, no. 43.

*Venus*, *Encycl. Meth.* pl. 299, f. 4. a. b.

*Cytherea læta*, Lamk. *An. s. Vert.* v. 567. no. 26.

Wood. *Ind. Test.* pl. 7. f. 49.

*Desh. Encycl. Meth. Vers.* ii. 56. no. 14 ; in Lamk. ed. 2. vi. 307, no. 26.

Hanley, *Descr. Cat.* p. 99.

Sow. *Thes. Conch.* p. 636, pl. 133, f. 1223, 124.

*Venus tumescens*, Blainv, *Malac.* pl. 74, f. 1.

*Chione læti*, Gray, *Cat. Cyth. Anal.* viii. 305,

*Cytherea prora*, Conrad, *Anni. Nat. Sc. Phil.* vii. 253, pl. 16. f. 18 ?

*Hab.* Oceanus Indicus : Insulæ Philippinæ.

(1718) *Dione inflata*.

D. testa inflata, subovali, lævi, alba, fusco radiatim variegata, latere postico subquadrato ; latere antico rotundato, breviusculo, margine ventrali elevato ; lunula indistincta, subexcavata ; umbonibus subretrorsis.

*Cytherea inflata*, Sow. *Thes. Conch.* p. 637, pl. 133, f. 127, 128.

*Hab.* Insulæ Philippinæ atque Moluccenses.

(1719) *Dione consanguinea*.

D. testa tenui, inflata, lævigata, pallida, prope umbones radiata, margine ventrali rotundata, antice elevata ; margine dorsali declivi, antici subacuminato ; lunula lat, circumscripta ; umbonibus inflatis, roseis.

*Cytherea consanguinea*, Sow. *jun. Thes. Conch.* p. 743, pl. 163, f. 203.

*Hab.* Panama (Adams).

(1720) *Dione obliquata*.

D. testa ovato-cordato (interdum oblongo-cordata), tumida aut ventricosa, solidiuscula, sublævigata, albida, lineis angularibus minutissimis

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brunneis aspersa ; margine ligamentali convexiusculo, subdeclivi ; ventrali subarcuato ; lunula magna, indistincta, colorum experte ; natibus valde obliquis, candidis, ligamento angusto ; extremitate postica obtusa superficie interne alba aut albido-rosea ; margine integro.

*Cytherea obliquata*, Wood. *Ind. Test. Sup.* pl. 15. f. 24.

Hanley, *Proc. Zool. Soc.* 1844, p. 107 ; *Sp. of Shells Append.*

Sow. *Thes. Conch.* p. 636, pl. 132, f. 125, 126,

*Hab.* Insulæ Philippinæ.

(1721) *Dione subpellucida*.

D. testa subovavli, ventricosa, tenui, lævi, purpurascente-grisea, maculis, fuscis seriatem radiata, latere antico brevi, lunula indistincta ; latere postico subelongato, subquadrata, margine dorsali declivi ; umbonibus prominulis.

*Cytherea subpellucida*, Sow. *Thes. Conch.* p. 639 ; pl. 133, f. 136.

*Hab.* Insula Lucon Philippinarum.

(1722) *Dione crocea*.

D. testa ovato-trigona, turgida, cordiformi, inæquilaterali, lævigata, polita, tenui, intus extusque pallide aurantia, ad marginem inferiorem saturatiore ; umbonibus tumidis, parum obliquis, acutis, rosaceis ; lunula vix distincta, magna, ovato-cordata, linea tenuissima circumdata ; ligamento immerso ; area posticali indistincta, nitentiore colore ata ; valvis tenuibus ; sinu pallii parum profundo, trigono, apice obtuso.

*Dione crocea*, Des. *Proc. Zool. Soc.* 1853.

*Hab.* Insulæ Philippinæ, Coll. Cuming.

(1723) *Dione rufescens*.

D. testa ovato-trigona, transversa, tumida, inæquilaterali, lævigata, transversim irregulariter striata, rufescente pallide castanea, posterius angulo obliquo absoleto, inflexa, antice angustiore obtusa, postice declivi, convexiuscula, margine inferiore convexo, antice ascendente ; umbonibus brevibus, tumidulis, obliquis ; lunula magna, ovato-cordata, in longitudine concava, ad apicem atroviolacea, fusca, et lineis fuscis fulgurata ; area elongato-acuminata, fusca ; valvis intus pallide croceis ; margine cardinali postice rubro maculato ; sinu pallii profundo, satis lato, apice obtuso, basi latiore.

*Dione rufescens*, Desh. *Proc. Zool. Soc.* 1853.

*Hab.* Insulæ Philippinæ, (Cuming.)

(1724) *Dione Kingii*.

D. testa ovali-oblonga, subcompressa, medio lævigata, ad latera substrita, albida castaneo fasciatim varie radiata ; latere antico brevi, declivi ; lunula elongata, in medio curinulata, distincta ; latere postico elongato, subquadrato, margine dorsali subelevato.

*Venus Kingii*, Gray. in Wood, *Suppl.* f. 9.

Hanley, *Descr. Cat.* p. 106 ; *Recent Shells.* p. 103.

Catlow, *Cat.* p. 38, no. 55.



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*Cytherea Kingii* (ex parte), *Sow. Thes. Conch.* p. 638. pl. 133. f. 129.

*Hab.* Insulæ-Nicobaricæ.

(1725) *Dione Lamarckii*.

D. testa ovato-transversa, inæquilaterali, extremitatibus obtusa, tumidula, lævigata, nitida, irregulariter obsolete striata, castaneo-fusca, also inæqualiter radiata; intus alba, cardine angusto; sinu pallii trigono, apice acuto, subæquilaterali.

*Chione Lamarckii*, *Gray. Anal.* viii. 306.

*Chione Lamarckii*, *Hanley. Descr. Cat.* p. 103.

*Callow. Conch. Nom.* p. 39. no. 58.

*Cytherea Kingii*, var. *Sow. Thes. Conch.* p. 638. pl. 133. f. 130.

*Hab.* Oceanus Indicus.

(1726) *Dione citrina*.

D. testa ovali, ventricosa, citrina vel pallide lutea, postice late pupureo unifasciata, irregulariter concentricè striata, latere postico subdeclivi, latere antico brevi; lunula lata, distincta.

*Cytherea citrina*, *Lamk. An. s. Vert.* ed 2. v. 306, no. 24.

*Sow. Thes. Conch.* p. 636, pl. 132. f. 117. 118.

*Desh. Encycl. Meth. Vers.* ii. 56.

*Deless. Rev. de. Coq.* p. pl. 8. f. 8.

*Hanley, Descr. Cat.* p. 99; in *Wood. Suppl.* pl. 13. f. 23.

*Chione striate Gray, Anal.* vii. 306 (non *Sow.* exby.)

*Hab.* Nova Hollandia, Sydneyi portu; Insulæ Philippinæ (*Cuming*).

(1727) *Dione Philippii*.

D. testa ovato oblonga compressiuscula, tenue striis transversis tenuissimis; albida raddis fulvis ornate, aut subunicolore flavescente; area nulla, lunula lanceolata, vix distincta.

*Cytherea modesta*, *Phil. Abbild. Conch.* p. 20, no. 3. pl. 8. f. 3. 1845. (non *Sow.*)

*Cytherea Kingii* (ex parte) *Sow. jun. Thes. Conch.* p. 638.

*Hab.* Insulæ Philippinæ.

(1728) *Dione indecora*.

D. testa cordato-trigona, satis tumida, utrinque subangulata, exquisite transversim sulcatolrigata, alba epidermide lutescente obducta; lunula magna, cordata, linea impressa circumscripta cæterum haud distincta; area nulla; ligamento suboculto.

*Cytherea indecora*, *Phil. Abbild. Cyth.* pl. 9. f. 7.

*Sow. Thes. Conch.* p. 634. pl. 136. f. 179.

*Hab.* Mergui imperium Birmanorum (*Th. Philippi*).

(1729) *Dione Manillæ*.

D. testa ovali subtrigona, ventricosa, alba, concentricè striata, postice acuminata, sublobata, antice breviuscula; lunula lata, subeomplanata, distincta.

*Cytherea Manillæ*, *Sow. Thes. Conch.* p. 634. pl. 136. f. 180. 181.

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*Hab.* Manilla (*Cuming*).

*Meroe. Syn. Cuneus Sunetta*, rec. 10 sp.

*Meroe. Malacca.*

(1730) *Cuneus Meroe*.

C. testa omnino planulatim, costata antico elongata, postice angulo subacuto; colore intus violaceo, extus pupureo, vel lineis acutangularibus purpuris ornato.

*Tellina madraspatana*, *Petiv. Gazoph.* pl. 13. f. 8.

*Tellina latior*, *List. Conch.* pl. 378 f. 221.

*Knorr, Vergn.* t. vi. pl. 7. f. 2, 4, 5.

*Venus Meroe*, *Linn. Syst. Nat.* ed 10 p. 637. no. 107; ed. 12. p. 1132; *Mus. Utr.* p. 502. no. 62.

*Venus Meroe*, *Gronovius. Zoophyl.* p. 171 n. 1161.

*Schrot. Einl.* t. iii. p. 130.

*Chemn. Conch.* t. vii. p. 55.

*Born. Test. Mus.* p. 67.

*Fuvarne, Conch.* pl. 47. f. A. 2.

*Dillw. Cat.* p. 185.

*Wood, Ind. Test.* pl. 8. f. 62.

*Donax, Encycl. Meth.* pl. 261. f. 1.

*Cuneus costatus*, *Megerle, Mag. de Berlin.* 1811. p. 50.

*Donax Meroe*, *Lamk. An. s. Vert.* t. v. p. 551i

*Desh. Encycl. Meth. Vers.* t. ii. p. 97. no. 9.

*Desh. in Lamk. An. s. Vert.* 2, ed. t. vi. p. 247.

*Cytherea Meroe*, *Sow. Genera of Shells.*

*Sow. jun. Conch. Mon.* f. 117 a.

*Reeve, Conch. Syst.* t. i. pl. 70. f. 6.

*Meroe picta*, *Scymacher Essai d'une Class.* p. 149. pl. 14. f. 3. *Gray, Cat. Cyth. Anal.* t. viii. p. 303.

*Sow. Thes. Conch.* p. 609. pl. 126. f. 1. 2.

An eadem? le suct, *Adans. Seneg.* p. 229. pl. 17. f. 13.

*Hab.* Mare. Senegalense- (*Adans*). Mare Indicum (*Auct.*); Insulæ Philippinæ (*Cuming*).

(1731) *Cuneus effossus*.

C. testa ovali-subcordiformi, subæquilaterali, crassa, nitida, convexa, transversim profunde sulcata: sulcis subremotis interstitiis planulatis; albido-livida, lineis angularibus, saturatoribus, venulata; ano impresso, lanceolato; vulva effossa, lateribus candidis fasciis spadiceis undulatis transversim picta, disco interno pupureo, marginibus crenatis.

*Cytherea effossa*, *Hanley. Proc. Zool. Soc. Lond.* 1842, p. 123. *Descr. Cat.* p. 109; in *Wood, Sup.* pl. 15. f. 18.

*Callow. Conch. Nomenc.* p. 37 no 34.

*Phil. Abbild. Conch.* pl. 9. f. 1.

*Wood. Suppl.* pl. 9. f. 18.

*Sow. Thes. Conch.* p. 609. pl. 126. f. 11. 12, *Meroe*.

*Hab.* Insulæ Philippinæ (*Cuming*).

(1732) *Cuneus seminudus*.

C. testa ovato-trigona, compressa, subæquilaterali, postice transverse sulcata, antico

# MOLLUSCA.

sublævi, albido-rosca, lineis roseis et punctis lividis reticulatis picta; vulva excavata; cardine ut in *C. Meroe*; margine crenulato.

*Cytherca seminuda*, *Phillippi, Abbild. Conch.* p. 97. pl. 3. f. 4.

*Donax seminuda*, *Anton, Wiegman. Arch.* (1837) t. i. p. 323.

*Venus seminuda*, *Anto. Verz. Conch.* p. 7. no. 263.

*Meroe seminuda*, *Sow. Thes.* p. 610. pl. 126. f. 15.

*Hab.* Insulæ Moluccenses (*Cuming*).

(1733) *Cuneus truncatus*.

*C. testa* ovato-transverso, inæquilaterali, lateraliter compressa, levigata, nitida, alba, lineis tenuibus rufis approximatis zigzagformibus inter se parallelis; latere antico longiore obtuso, postico oblique subangulato, extremitate truncato; vulva angusta, lanceolata, margine acuto circumscripta; lunula livida, angustissima, non impressa, vix distincta, valvis intus violaceis, ad margines pallidioribus.

*Cuneus truncatus*, *Desh. Proc. Zool. Soc.* 1853.

*Hab.* Insulæ Philippinæ. Coll. *Cuming*.

(1734) *Cuneus excavatus*.

*C. testa* lævigata, subrotunda, lata, antice brevi angusta, postice expansa; margin dorsali elevato angulo obtuso, margin ventrali rotundato; colore violaceo vel pallide fulvo, purpureo interruptim radiato.

*Cytherca excavata*, *Hanley, Proc. Zool. Soc.* 1842, p. 123, *Descr. Cat.* p. 109; in *Wood, Sup.* pl. 15. f. 19.

*Meroe excavata*, *Sow. Thes. Conch.* p. 610 pl. 126. f. 13, 14.

*Hab.* Oceanus Japonicus.

(1735) *Cuneus Solandri*.

*C. testa* levigata, tumida, subæquilaterali, subovali; margin ventrali rotundato; colore albo, maculis fasciisque fuscis angulatum, scripto.

*Cytherca Solandri*, *Gray, in Wood, Sub.* pl. 2. f. 11.

*Meroe Solandri*, *Gray, Cat. Cyth. Anal.* t. viii p. 303.

*Sow. Thes. Conch.* p. 611. pl. 126. f. 10.

*Hab.* China.

(1736) *Cuneus scriptus*.

*C. testa* lævigata antice subelongata, postice subacuta, intus violacea, extus lineis acutangularibus scripta: variat purpurea immaculata, alba, auranta, vel fusca, scripta.

*Cuneus scriptus*, *Rumph. Mus. Amb.* pl. 43. f. L. M.

*Tellina lata*, *Lister, Conch.* pl. 379. f. 222. & pl. 380. f. 223.

*Chama literata*, *Petiver, Amb. Mus.* pl. 18 f. 5.

*Knorr. Vergn.* t. vi. pl. 7. f. 4. 5.; pl. 28 f. 7.

*Donax scripta*, *Linn. Syst. Nat.* ed. 10. p.

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683. no. 88. ed. 12. p. 1127; *Mus. Utr.* p. 495.

*Murray, Fund. Test. Amæn. Acad.* t. viii p. 147. pl. 2. f. 5.

*Gronov. Zooph.* p. 268. no. 1136.

*Chemn. Conch.* t. vi. p. 267, pl. 26. f. 261-265.

*Schrot. Einl.* t. ii. p. 98.

*Gmel.* p. 3264. no. 15.

*Donax, Encycl. Meth.* pl. 261. f. 2, 3, 4.

*Dillw. Cat.* t. i. p. 154. no. 15.

*Wood. Ind. Test.* pl. 6. f. 15.

*Lamk. An. s. Vert.* t. v. p. 551. no. 23.

*Desh. in Lamk.* 2 ed. t. vi. p. 247.

*Hanley, Descr. Cat.* p. 83.

*Meroe scripta*, *Gray, Cat. Cyth. Anal.* t. viii p. 303.

*Sow. jun. Thes. Conch.* p. 60. pl. 126. f. 3-8.

An eadem spec.? *Venus donacina*, *Gmel.* p. 3295.

*Hab.* Oceanus Indicus.

(1737) *Cuneus Birmanicus*.

*T. testa* ovata, subtriangulari, satis tumida, lævissima, sulcis brevissimis transversis modo in latere postico exarata, albida, lineis purpureis in ziczac flexis reticulata; margine ventrali valde convexo; extremitate antica rotundata, altiore quam postica; area profundissima, excavata; lunulata oblonga, impressa; margin crenulato.

*Cytherca Birmanica*, *Phil. Abbild. and Beschr. Cyther.* p. 42. pl. 9. f. 8.

*Hab.* Mergui imperium Birmanorum.

*Trigona. rec.* 23 sp. also fossil.

*Sub Genus.* *Trigona*.

*Cytherca undulata. Mazatlan.*

*Sub Genus.* *Trigona. Malacca.*

(1738) *Trigona Stultorum*.

*T. testa* ovato-transversa, subtrigona, æquilaterali, subsymmetrica, utroque latere obtusa, antice compressiuscula, albo-grisea, flavo-rufescente radiata; umbonibus minimis, acutis, oppositis; lunula ovato-lanceolata, obsoleto circumscripta; latere antico irregulariter striato; valvis intus albis; sinu pallii brevi trigono; dentibus cardinalibus inæqualibus, postico maximo.

*Donax Stultorum*, *Gray, in Wood. Ind. Sup.* pl. 2. f. 2.

*Trigona Stultorum*, *Gray, Anal.* t. viii. p. 304.

*Hab.* Mare Indicum (*Gray*).

Sub nomine *Cytherce Stultorum* alteram speciem descripsit et delineavit *Clar. Philippus*.

(1739) *Trigona virginea*.

*T. testa* oblongo-triangulari, æquivalvi, crassiuscula, cinerascens-alba, nitente, radiatim obscure fasciata, latere postico linea impresso; area postica violascente.

*Cytherce virginea*, *Adams & Reeve, Voy. of Samarang, Moll.* p. 78 pl. 24. f. 10.

*Sow. Thes. Conch.* p. 613. pl. 127. f. 5.

*Hab.* Insulæ Moluccenses.



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### (1740) *Trigona damaoides*.

T. testa rotundato-trigona, æquilaterali, tumida, ponderosa, lævi, alba, radiis interruptis rufis picta; area lunulaque haud distinctis; ligamento valde prominulo; sinu palliari usque ad mediam testam diducto.

Venus damaoides, *Gray in Wood, Ind. Sup. pl. 2. f. 17.*

Cytherea damaoides, *Hanley, Descr. Cat. p. 107.*

*Sow. jun. Thes. Conch. pl. 127. f. 7-9.*

Trigono damaoides, *Gray, Cat. Cyth. Anal. t. viii. p. 304.*

Cytherea ponderosa, *Hanley, Descr. Cat. p. 107.*

*Phil. Abbild. Conch. pl. 1. f. 1.*

*Wood, Sup. 2. pl. 15.*

*Catlow. Cat. Sow. p. 40. no. 88.*

*Hab. Mare Rubrum; Oceanus Indicus.*

### (1741) *Trigona dolabella*.

T. testa trigona, solida, alta, pallida, lævigata, epidermide fusco induta; latere postico angulato, subexcavato, ad basin subrostrato; latere antico rotundato; lunula parva distincta; margine ventrali subarcuato, umbonibus acutis.

Cytherea dolabella, *Sow. Thes. Conch. p. 619. pl. 127. f. 19.*

*Hab. Mare Rubrum.*

### (1742) *Trigona ventricosa*.

T. testa subtrigona, inflata, altissima, lævi; latere postico late angulato et complanato, latere antico subincurvato; margine ventrali antice subrotundato; lunula cordiformi, in margine impresso; colore pallido, fusco fasciatim scripto,

Trigona ventricosa, *Gray. Cat. Cyth. Anal. t. viii. p. 304.*

Cytherea ventricosa, *Sow. Thes. Conch. p. 613. pl. 121. f. 6.*

*Hab. Mare Chinense.*

### (1743) *Trigona dubia*.

*Sow. jun. See "T. DAMAOIDES," p. 47.*

*Hab. China.*

Sub-genus. Grateloupia. fossil 4 sp.

Artemis, *Syn. Dosinia, rec. 85 sp. fossil 8 sp.*

Artemis. Malacca.

Artemis. Pulicat.

Artemis, undescribed. Malacca.

### (1744) *Dosinia consobrina*, *Desh. MSS.*

D. testa rotundato-lenticulari, valde inæquilaterali, convexiuscula, concentrice minute striata, grieso-flava; latere antico brevi obtuso; umbonibus pravis acuminatis, obliquis, vix prominentibus; lunula ovato-cordata, impressa, plana, ligamento immerso; valvis intus albis, sinu pallii angusto, obliquo, profundissimo, apice obtuso.

*Hab. Caput Bonæ Spei.*

D. isocardiae affinis, sed magis compressa, umbonibus minoribus; lunula multo magis impressa; valvis semper intus candidis, danique sinu pallii profundiore atque angustiore.

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### (1745) *Dosinia plana*.

D. testa orbiculari, superne subacuminata, peculiariter planocompressa, concentrice subtilissime seu creberrime striata, striis medio plus minusve obsoletis, area ligamenti simplici; lunula oblongo-cordata, umbonibus parvis; alba, epidermide cornea tenuissima marginem versus induta.

Artemis plana, *Reeve. Conch. Icon. pl. 3. f. 18.*

*Sow. jun. Thes. Conch. p. 658. no. 11. pl. 140. f. 10.*

*Hab. China.*

### (1746) *Dosinia dilatata*.

D. testa orbiculari, æquilaterali, margine dorsali fere rectilineo, alba fulvo radiata; striis transversis elevatis, scabris; lunula cordata impressa cardine ut in *Dosinia exoleta* (*Chemn.*).

Venus exoleta æquilateralis, *Chemn. Conch. t. vii. p. 22. pl. 38. f. 46.*

Cytherea (Artemis) dilatata, *Philip. Abbild. Conch. p. 6. no. 13.*

An Art. Amphidesmoides? *Reeve.*

*Hab. India occidentalis.*

### (1747) *Dosinia amphidesmoides*.

D. testa suborbiculari, concentrice elevato-striata; striis ad latera convergentibus, paucioribus, area ligamenti simplici, lunula cordata, subimpressa; alba aut rubida, obscure roseo-radiata, circa umbones violaceo-roseis.

Artemis amphidesmoides, *Reeve, Conch. Icon. Artemis, pl. 8. f. 48.*

*Sow. jun. Thes. Conch. p. 659. no. 15. pl. 141. f. 17-19.*

*Hab. Insula Burias Philippinarum.*

### (1748) *Dosinia glauca*.

D. testa transverse ovata, latiore quam alta compressiuscula, concentrice striata, striis medio superficialiis, ad latera acute et tenuissime liratis, liris obtuse serratis; area ligamenti vix lanceolata excavata; lunula cordata, impressa; glauco-albida.

Artemis glauca, *Reeve. Conch. Icon. pl. 10. f. 8.*

*Hab. Insula Zebu Philippinarum.*

### (1749) *Dosinia trigona*.

D. testa trigono-ovata, crassiuscula, concentrice subirregulariter rugoso-striata, area ligamenti parviuscula, simplici, lunula perampla, superficialia, fere obsoleta; albida, ferrugineo tincta, lunula cærulescente albo-nitente.

Artemis trigona, *Reeve. Conch. Icon. pl. 7. f. 42.*

*Sow. jun. Thes. Conch. p. 659, pl. 141, f. 29.*

Cytherea trigona, *Sow. jun. Thes. Conch. p. 633, pl. 133, f. 120.*

*Hab. Mare Rubrum.*

### (1750) *Dosinia angulosa*.

D. testa subquadrato-orbiculari, valde inæqualiterali, valde compressa, alba, confertissime transversim striata; striis antice et postice paucioribus, lamellaribus; area distincta, lineari-lan-

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celtoaa, laeviuscula; lunula cordato-lanceolata plana.

*Artemis angulosa*, *Phil. Abbild. Conch. Cyth.* p. 31. pl. 6. f. 1.

*Artemis longilunata*, *Reeve Conch. Icon.* pl. 10. f. 61 ?

*Artemis angulosa*, *Sow. jun. Thes. Conch.* p. 662, pl. 41 f. 26.

*Artemis penicillata* var., *Reeve. Conch. Icon.* pl. 6. f. 36.

*Hab.* Malacea Philippinarum atque littus Chiliense.

(1751) *Dosinia rubicunda*.

D. testa parva, orbiculari, aurantio-nitente, tenuissime striata, fere laevi; area distincta nulla; lunula convexa, cordata, lineola impressa, parum conspicua, aegre circumscripta.

*Artemis rubicunda*, *Phil. Abbild. Conch. Cyth.* p. 32. pl. 6. f. 9. *Sow. jun. Thes. Conch.* p. 664. pl. 142. f. 40, 41.

*Hab.* Mare Rubrum.

(1752) *Dosinia hepatica*.

D. testa subquadrato-orbiculari, tenuicula, compressa, concentrice tenuissime striata, sub lente striis tenuissimis radiantibus impressa, area ligamenti simplici, lunula subelongato-cordata superficialia, vix nulla, livido-caerulescente; umbonibus pallide rufescentibus aut flavilis, intus violacea.

*Cythera hepatica*, *Lamk. An. s. Vert. t. v. p.* 312.

*Desh. in Lamk. 2 ed. An. s. Vert. t. vi. p.* 574. no. 44.

*Delessert, Rec. de. Coq.* pl. 9. f. 8.

*Hanley, Descr. Cat.* p. 101: in *Wood, Sup.* pl. 13. f. 33.

*Artemis hepatica*, *Phil. Abbild. Conch. Cyth.* pl. 4. no. 3. pl. 2. f. 3.

*Reeve, Conch. Icon.* pl. 1. f. 7.

*Krauss Sudafrika, Moll.* p. 10. no. 3.

*Sow. jun. Thes. Conch.* p. 663. pl. 142. f. 35, 36.

*Hab.* Australia (*Lamk.*); Caput Bonae Spei (*Krauss.*).

(1753) *Dosinia lucinoides*.

D. testa subquadrato-orbiculari, medio tumida, postice subcontracto, concentrice subtilissime et creberrime striata, striis ad latera vix paucioribus, area ligamenti lanceolato-excavata, lunula cordata, impressa; sordide alba.

*Artemis lucinoides*, *Reeve. Conch. Icon.* pl. 3. f. 49.

*Sow. jun. Thes. Conch.* p. 664. pl. 142. f. 39.

*Hab.* Insulae Moluccarum (*Reeve*); Guinea (*Sow.*)

(1754) *Dosinia solidula*.

D. testa alba, solida, concentrice striata; area dorsali depressa, subexcavata, declivi; lunula distincta, convexa, (*Sow. jun.*)

*Artemis solidula*, *Sow. jun. Thes. Conch.* p. 664. pl. 142. f. 38.

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*Hab.* —?

(1755) *Dosinia caerulea*

D. testa orbiculari, medio convexo-tumida, postice subangulata; crassa, concentrice subtiliter elevato-striata, area ligamenti sublate excavata, lunula cordata; albida, umbones versus rosaceo et caeruleo tinctoria.

*Artemis caerulea*, *Reeve, Conch. Icon.* pl. 4. f. 25.

*Sow. jun. Thes. Conch.* p. 664. pl. 142. f. 43, 44.

*Hab.* Fretum Torres dictum.

(1756) *Dosinia sericea*.

D. testa transverse ovata, latiore quam alta, concentrice tenuissime striata, area ligamenti simplici, subplanato, lunula cordata, subampla; flavicante alba, umbones versus carneo tinctoria.

*Artemis sericea*, *Reeve. Conch. Icon.* pl. 8. f. 36.

*Sow. jun. Thes. Conch.* p. 665. pl. 142. f. 42.

*Hab.* Mare Japonicum.

(1757) *Dosinia alta*.

D. testa orbiculari, albida ad umbones rubescente, subcompressa, nitida, concentrice tenuiterque striata striis nonnullis obsoletis ab umbonibus radiantibus instructa; area impressa lineari-lanceolata, striata; lunula cordiformi, linea profunda terminata; umbonibus parvulis; colore intus albido circa impressionem palliorem rubente.

*Artemis alta*, *Dunker. Zeits. für. Malac.* (1848), p. 184. no. 16.

*Hab.* Mare Rubrum.

Testa notabilis, altior quam lata, radiatim ab umbonibus striata. *Dosinia Africanæ proxima*; lunula striata et margine postico subangulata distincta.

(1758) *Dosinia bilunulata*.

D. testa subtrigono-orbiculari, superne attenuata, compresso-planata, concentrice tenuissime striata, striis ad latera subprominentioribus, in squamis lamellæformibus terminatis, ad latus anticum ante marginem lunulam secundam formantibus; area ligamenti latissima, excavata, laevigata; lunula prima cordata, subprofunde impressa, secunda oblongo-cordata, multo majore alba, radiis pallide roseis interruptis concinne picta.

*Artemis bilunulata*, *Hanley, Descr. Cat.* p. 106; in *Wood. Sup.* pl. 19. f. 44.

*Gray, Anal.* 1838. t. viii. p. 309.

*Reeve. Conch. Icon.* pl. 4. f. 22.

*Artemis bilunulata*, *Sow. jun. Thes. Conch.* p. 670. pl. 143. f. 66.

*Hab.* Mare Japonicum.

Sinus pallii triangularis, brevis, apice acutissimus, subaequilateralis.

(1759) *Dosinia Cumingii*.

D. testa vix orbiculari, postice conspicue angulato-producta et truncata, concentrice subtilissime et creberrime striata; striis ad latera convergentibus, extremitatibus per marginem pos-



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ticum squamato-laminatis; area ligamenti perampla, lata, parum excavata; lunula cordata, impressa; albida, ferrugineo-fusco eximie tincta et radiata.

*Artemis Cumingii*, *Reeve. Conch. Icon.* pl. 9. f. 30.

*Sow. jun. Thes. Conch.* p. 670. pl. 143. f. 61.

*Hab.* Insula Zebu Philippinarum.

c. *Area dorsali excavata.*

(1760) *Dosinia exasperata.*

D. testa subquadrato-orbiculari, lactea, concentrice irregulariter sulcata, liris subundatis, hic illic convergentibus, ad latera prominentioribus, interruptis et corrugatis, ad marginem conspicue squamato-lamellatis erectis; area ligamenti late excavata, lævigata; lunula cordata, linea profunde impressa circumscripta.

*Cytherea (Artemis) exasperata*, *Phil. Abbild. Conch. Cyth.* p. 36, no. 4, pl. 8. f. 4.

*Reeve. Conch. Icon.* pl. 4. f. 21.

*Sow. jun. Thes. Conch.* p. 670. pl. 143. f. 62?

*Hab.* India orientalis, sinus Manillæ, insulæ Philippinæ.

(1761) *Dosinia Sieboldii.*

D. testa orbiculari, convexa, concentrice subtiliter et creberrime lirata, liris ad latera, præcipue ad posticum multo paucioribus, divaricatis et corrugatis, squamarum grandium serie unica per marginem posticum; area ligamenti latiuscula, vix excavata; lunula cordata; ferrugineo-spaldiceo subobscurè faciata.

*Artemis Sieboldii*, *Reeve. Conch. Icon.* pl. 7. f. 39.

*Sow. jun. Thes. Conch.* p. 669, pl. 143. f. 57.

*Hab.* Mare Japonicum.

(1762) *Dosinia excisa.*

D. testa subtrigono-orbiculari, albida, crassiuscula, concentrice rugoso-striata; area ligamenti profunde excavata; lunula ampla obsoleta.

*Venus excisa*, *Chemn. Conch. t.* vii. p. 17, pl. 38, f. 400, 401.

*Artemis excisa*, *Phil. Abbild. Conch. Cyth.* p. 6. no. 4, pl. 2. f. 4?

*Gray. Cat. Cyth. Analist.* viii. p. 308.

*Reeve. Conch. Icon.* pl. 7, f. 43.

*Sow. jun. Thes. Conch.* p. 671, pl. 143. f. 69,

*Cyth. immaculata?* *Lamk. An. s. Vert.* ed. 2. p. 313? an eadem species.

*Hab.* Insulæ Nicobaricæ, Tranquebar (*Chemnitz*).

(1763) *Dosinia prostrata.*

D. testa quadrato-orbiculari, depressa, alba, concentrice striata; striis ad latera irregulariter convergentibus et corrugatis, in margine areæ et lunulæ lamellaribus et squamatis; area ligamenti subexcavata; lunula elongato-cordata; dentibus cardinalibus quatuor, latirialibus divaricatis.

*Venus prostrata*, *Linn. Syst. Nat.* ed. 10, p. 688 no. 117; ed. 12. p. 1133.

*Linn. Mus. Ulr.* p. 504. no. 66.

*Chemn. Conch. t.* vi. p. 302. pl. 29. f. 298?

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*Encyclop. pl.* 277. f. 1.

*Cytherea prostrata*, *Lamk. An. s. Vert. t.* z. d. 573. 50?

*Desh. in Lamk.* ed. 2. t. vi. p. 317. no. 50?

*Artemis prostrata*, *Gray, Anal.* 1838, t. viii. p. 309?

*Reeve. Conch. Icon.* pl. 4. f. 23.

*Sow. Thes. Conch.* p. 674. pl. 144. f. 83.

*Phil. Abbild. Conch. Cyth.* p. 7. no. 17?

*Artemis Bruguieri*, *Gray, Anal.* t. vii p. 309.

*Hab.* Littus Coromandelianum (*Chemnitz*), ad Novam Hollandiam, Flumen Cygnorum.

(1764) *Dosinia corrugata.*

D. testa suborbiculari, aliquanto latiore quam alta, tenui, convexa, concentrice, striata striis in medio fere obsoletis, ad latera posticum liras convergentes et corrugatas formantibus, ad latera anticum minus elevatis, longitudinaliter lineis indentatis obsolete radiata; area ligamenti simplici; lunula suboblongo-cordata; sordide spaldiceo-alba.

*Artemis corrugata*, *Reeve. Conch. Icon.* pl. 4. f. 24.

*Sow. Thes. Conch.* p. 669. pl. 143. f. 63.

*Hab.* —?

(1765) *Dosinia laminata.*

D. testa orbiculari, postice, subangulata, concentrice laminata; alba, laminis tenuibus, umbones versus reflexis, ad latera majoribus; area ligamenti subexcavata; lunula cordata, parva, impressa.

*Artemis laminata*, *Reeve. Conch. Icon.* pl. 7. f. 41.

*Sow. jun. Thes. Conch.* p. 674. pl. 144. f. 86, 87.

*Hab.* Insula Tamar Philippinarum.

(1766) *Dosinia Polita*, *Desh.*

D. testa rotundato-lenticulari, inæquilaterali, convexiuscula, candissima, polita, nitida, sub lente tenuissime striata, striis obsoletis ad apices evanescentibus; umbonibus parvis, obliquis, vix prominentibus; lunula minima, ovato-acuminata, impressa; area angusta, lanceolata in medio vix depressa; sinu palli magno, trigono, profundo, superne rectilineo in medio valvæ imposito.

*Hab.* Littus Gambiense.

D. Africanæ affinis, sed striæ minores valvæ teniores, lunula minore angustiore, valvis intus albis-seu roseo-purpureis, sinu palli minus obliquo, base latiore.

(1767) *Dosinia anus.*

D. testa subquadrato-orbiculari, longiori, quam alta, compressa, erufa albida; rugis elevatis distantibus, ad utramque extremitatem numero decrescentibus, sed magis elevatis et lamellaribus; lunula cordata, profunde impressa, lamellosa; area angusta, lineari-lanceolata, lævi, excavata; dente cardinali antico striato; sinu palliari abbreviato, obtuso.

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*Artemis anus*, *Philippi*, *Zeits. fur. Malak.* 1848; p. 132. no. 64.

*Phil. Abbid. Conch. Cyth.* p. 39. pl. 8. f. 1.

*Reeve, Conch. Icon.* pl. 2. f. 10.

*Sow. jun. Thes. Conch.* p. 674. pl. 144. f. 32.

*Hab.* Nova Zelandia.

(1768) *Dosinia modesta*.

D. testa suborbiculari, compressa, umbones versus subattenuata, concentrice minutissime et creberrime impresso-striata, striis irregularibus radiantibus obscure notata; area ligamenti lanceolato-excavata, lunula oblongo-cordata, impressa; carneo albicante, nitente.

*Artemis modesta*, *Reeve, Conch. Icon.* pl. 9. f. 4.

*Sow. jun. Thes. Conch.* p. 663 pl. 142, f. 37,

*Hab.* —?

(1769) *Dosinia juvenis*.

D. testa suborbiculari, crassiuscula, concentrice tenuilirata, liris ad latera sublamellatis; area ligamenti subampla, excavata; lunula cordata, plano-impressa; alba, biradiata, rufo maculata.

*Lister, Conch.* p. 295. f. 131?

*Venus juvenis*, *Chemn. Conch.* t. vii. p. 21. pl. 33. f. 405.

*Dillw. Cat.* t. i. p. 196.

*Venu juvenis*, *Gmel.* p. 3287. no. 84.

*Venus*, no. 36, *Schrot. Einl.* t. iii. p. 167.

*Encycl.* pl. 280. f. 2. a b.

*Cytherea juvenilis*, *Lamk. An. s. Vert.* (*Desh.* ed.) t. vi. p. 310, no. 36.

*Desh. Ency. Meth. Vert.* t. ii. p. 57. no. 17.

*Artemis juvenilis*, *Gray. Cat. Cyth. Anal.* t. viii. p. 309.

*Reeve. Conch. Icon.* pl. 1. f. 5.

*Phil. Abbid. Conch. Cyth.* p. 6 no. 12. exclus. *Chemn.* fig. 407.

*Sow. jun. Thes. Conch.* p. 673, pl. 144. f. 74, 76.

Var. Testa rufescente, *Desh.*

*Cytherea rufa*, *Lamk. An. s. Vert.* t. v. p. 570 no. 37.

*Cytherea rufa*, var. *juvenilis*, *Desh. in Lamk. An. s. Vert.* ed. 2, vi. p. 311, note.

*Artemis rufa*, *Reeve. Conch. Icon.* pl. 1. f. 3.

*Sow. Thes. Conch.* p. 673, pl. 144, f. 77.

Var. ? *Artemis variegata*, *Gray. Cat. Cyth. Anal.* t. viii. p. 309, an varietas?

*Hab.* Amboina Philippinarum.

(1770) *Dosinia variegata*.

D. testa orbiculari, nunc tumidiuscula, nunc compressa, concentrice lirata, liris interdum subtilibus numerosis, interdum sublamellatis, laminis umbones versus reflexis; area ligamenti vix excavata, lunula cordata, impressa; albida, facis tribus rufocastaneis plus minus distincte radiata, interstitiis lineis flexuosis, saepe interruptis; lunula fusca; umbonibus interdum roseis, area ligamenti fusco tessellata.

*Venus exoleta variegata*, *Chemn. Conch.* t. vii. p. 22. f. 407.

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*Venus*. no. 38, *Schrot. Einl.* iii. p. 169.

*Venus histrio*, *Gmel.* p. 3287.

*Dillw. Cat.* t. i. p. 197, no. 87.

*Wood. Ind. Test.* pl. 8. f. 86.

*Encyc. Meth.* p. 280, f. 1?

*Venus australis*, *Quoy. et Gaim. Voy. Astr.* pl. 84. f. 11. 12.

*Artemis australis*, *Philippi. Abbid. Conch.* p. 6, no. 15.

*Gray, Dieffenb. Travels* ii. § *Revue. Zool.* (1844), p. 405.

*Gray, Analyst.* (1838, viii. p. 309.

*Artemis variegata*, *Reeve Conch. Icon.* pl. 6. f. 33.

*Sow. jun. Thes. Conch.* p. 675, pl. 144, f. 83.

Var. *Artemis lirata*, *Sow. jun. Thes. Conch.* p. 675, pl. 144, f. 85.

*Hab.* Insulae Philippinae. Amboina et Australia.

(1771) *Dosinia lenticularis*.

D. testa lenticulari, compressa, pallide fulva, fusco-radiata, et literata, concentrice confertim costellata area ligamenti vix excavata; lunula impressa (*Sow. jun.*)

*Artemis exoleta*, var. *Reeve. Conch. Icon.* pl. 5. 29, b.

*Artemis variegata*, var. *Reeve. Conch. Icon.* pl. 6, f. 33, c.

*Artemis lenticularis*, *Sow. jun. Thes. Conch.* p. 675. pl. 144. f. 81

*Hab.* Insulae Philippinae.

(1772) *Dosinia scabra*.

D. testa suborbiculata, valde inaequilaterali, satis tumida, lamellis brevibus concentrice aspera, albida, radiis rugis obsoletis, zonisque violascentibus picta; lunula late cordata, profunde impressa; area lanceolata, profunda, laevi.

*Artemis scabra*, *Philippi, Zeits. fur. Malak.* 1849, p. 19. no. 81.

*Hab.* Insula Liew Kiew in mari chinensi.

(1773) *Dosinia aspera*.

D. testa orbiculari, tenuicula, subcompressa, concentrice creberrime striata, striis elevatiusculis, irregularibus, asperis, ad latera parum prominentioribus; area ligamenti plano-excavata, laevigata; lunula cordata; sordide alba.

*Artemis aspera*, *Reeve. Conch. Icon.* pl. 9. f. 49.

*Sow. jun. Thes. Conch.* p. 668. pl. 143. f. 56.

*Hab.* Manilla.

(1774) *Dosinia canaliculata*.

D. testa parva, tumida, sordide alba, minutissime striata, striis ad latera elevatiusculis; umbonibus prominentibus, acutis; area ligamenti duplicata.

*Artemis canaliculata*, *Sow. jun. Thes. Conch.* p. 668. pl. 143. f. 58

*Hab.* Manilla.

(1775) *Dosinia Japonica*.

D. testa suborbiculari, compressa, aliquando latiore quam alta, postice superne angulosa, con-



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centrice subtiliter elevato-striata, striis ad latera paucioribus sublamellatis; area ligamenti late excavata, margine subproducta, et obscure spinosa; lunula oblongo-cordata, impressa; sordide carneo-cinerascente.

*Artemis Japonica*, *Reeve, Conch. Icon.* pl. 3. f. 17.

*Sow. jun. Thes. Conch.* p. 669. pl. 143. f. 60.

*Hab.* Mare Japonicum.

Sinus pallii profundissimus angustus, apice acuto, linea superiore recta horizontali.

(1776) *Dosinia Gruneri*.

D. testa suborbiculari, postice producta, subangulata, modice convexa, alba, striis transversis confertis, ad aream magis elevatis, spinula terminatis, in extremitate antica numero valde decrescentibus, rugæformibus; lunula cordato-plana, profundissime impressa; margine dorsali postice valde declivi; area lineari-lanceolata, longissima, excavata, lævi.

An *Veneris excisæ* var. apud *Chemn.* vii. p. 18? pl. 38 f. 401?

*Artemis Gruneri*, *Phil. Zeits. fur. Malak.* (1848) p. 132. no. 63.

*Phil. Abbild. Conch. Cyther.* p. 39. no. 2. pl. 8. f. 2.

*Reeve, Conch. Icon.* pl. 5. f. 31?

*Sow. jun. Thes. Conch.* p. 666. pl. 142. f. 47.

*Hab.* Mare Chinense.

(1777) *Dosinia calculus*.

D. testa suborbiculari, plano convexa, compressa, concentrice, subtilissime et creberrime striato-lirata; area ligamenti subangulariter excavata, lunula cordata, impressa; alba, umbonibus ad apices pallide roseis.

*Artemis calculus*, *Reeve, Conch. Icon.* pl. 8. f. 47.

*Sow. jun. Thes. Conch.* p. 667. pl. 42. f. 53.

*Hab.* Insulæ Phillipinæ.

(1778) *Dosinia bis cocta*.

D. testa suborbiculari, tumidiuscula, concentrice striata, striis asperis, elevatiusculis, præcipue ad latera; area ligamenti lanceolato-excavata, lunula cordata, impressa; sordide alba, ferrugineo pallide tincta.

*Artemis bis cocta*, *Reeve, Conch. Icon.* pl. 9. f. 55.

*Sow. jun. Thes. Conch.* p. 667. pl. 142. f. 50.

*Hab.* Mare Japonicum (*Siebold*).

(1779) *Dosinia cretacea*.

D. crassa testa orbiculari; postice subflexuosa. concentrice tenuistriata; alba; striis ad latera elevatioribus, præcipue per marginem posticum, area ligamenti subampliter excavata, lunula, cordata, impressa.

*Artemis cretacea*, *Reeve, Conch. Icon.* pl. 6. f. 35.

*Sow. jun. Thes. Conch.* p. 667. pl. 142 f. 51.

*Hab.* Manilla in insula Lucon Philippinarum.

(1780) *Dosinia calata*.

D. testa subquadrato-orbiculari, tenuicula

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compressa, concentrice subtilissime striata, striis creberrimis, ad latera multo paucioribus, subcorugatis; area ligamenti simplici, area secunda subexcavata, tunc laminata, circumdata, lunula subelongato-cordata; alba, umbonibus flavicantibus.

*Hab.* Insula Lucon, Philippinarum.

(1781) *Dosinia contracta*.

D. testa ovato-orbiculari, altiore quam longa, albida, concolore, tenuissime striata; lunula cordata, impressa; ligamento in area profunda immerso.

Venus concentrica minor, *Chemn. Conch. t.* vii. p. 20. pl. 38. f. 403, excl. syn

*Artemis contracta*, *Phil. Abbild. Conch. Cyth.* p. 6, no. 11.

*Hab.* India orientalis (*Chemnitz*).

Sub-genera. *Cyclina. rec.* 10 sp. fossil 1 sp. *Clementia. rec.* 3. sp.

(1782) *Cyclina Chinensis*.

C. testa subquadrato-orbiculari, tenuicula, valde gibbosa, concentrice subirregulariter striata, striis elevatiusculis, striis aliis tenuibus impressis radiantibus decussatis, area ligamenti simplici, lunula nulla, marginibus intus crenulatis; albida ferrugineo tincta, marginem versus cinero-cærulescente.

Venus Chinensis, *Chemn. Conch. Cab.* x. 396. pl. 171. f. 1663.

*Dillw. Cat.* i. 192. no. 77.

*Wood, Ind. Test.* pl. 8 f. 76.

*Desh. in Lamk. An. s. Vert.* vi. 291. no. 6.

Venus Sinensis, *Gmel.* p. 3285. no. 91.

*Hanley, Descr. Cat.* p. 116.

*Cyprina tenuistria*, *Lamk. An. s. Vert.* v. 558.

*Artemis sinensis*, *Reeve, Conch. Icon.* pl. 1. f. 6.

*Sow. jun. Thes. Conch.* p. 661. no. 20.

*Cyclina Chinensis*, *Desh. Traite. Elem.* i. pl. 14 bis, f. 20-22.

*Hab.* Mare Chinense.

(1783) *Cyclina flarida*.

C. testa orbiculari, obliqua, inæquilaterali, tumida, transversim striata, striis convexis; umbonibus tumidis, magnis, obliquis; lunula nulla; margine tenue dentato; impressione musculari postica semilunari; sinu pallii profundo, lato, apice obtuso, cardine in utraque valva tridentato; dento postico valvæ dextræ bifido; valvis extus flavis, intus candidis.

*Hab.* China.

(1784) *Cyclina orientalis*.

C. testa rotundata, ventricosa, concentrice et radiatim ad latera vix striata, pallide aurantia, prope marginem ventralem rubescens; intus margine crenato, lunula nulla.

*Artemis orientalis*, *Sow. jun. Thes. Conch.* p. 661. no. 21, pl. 144. f. 79.

*Hab.* Mare Japonicum.

(1785) *Clementia granulifera*.

C. testa parva, Cl. papyraceæ simili, sed rectiuscula, antice paululum subtruncata, postice

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*Clementia granulifera*, Sow. *jun. Thes. Conch.* p. 700, pl. 151. f. 156.

*Hab.* Insulæ Philippinenses, in insula Zebu dicta.

(1786) *Clementia? vitrea*.

*C.* testa cordata, candida, diaphana, fragilissima, transversim striata, plicata, rugosa, vulva intrusa, lanceolata, ano ovalioblongo.

*Mactrea vitrea*, Chemn. *Conch. Cab.* xi. 219, pl. 200. f. 1959, 1960 (non Gray).

*Hab.* Littus Coromandeliense; insula Ceylon (*Chemnitz*).

*Lucinopsis*. *Syn.* *Dosinia*. *Mysia*. *Cyclina*, *rec.* sp. fossil 3 sp.

*Tapes*. *Syn.* *Paphia*. *Pullastra*, *rec.* 78 sp. also fossil.

*Tapes ramosa*. *Malacca*.

(1787) *Tapes malabarica*.

*T.* testa ovato-oblonga, tumida, subcordata, antice angustiore, postice subsinuata, transversim dense striata, sæpius flavo-cinerea vel cinerea quadriradiata, radiis obscurioribus intus roseo-purpurascens; margine superiore antico excavato; lunula magna, ovato-cordata, lævigata, sæpius pallida, livida.

*Venus malabarica*, Chemn. *Conch.* vi. 323. pl. 31. f. 324, 325.

*Dillow. Cat.* i. 174. no. 36.

*Lamk. An. s. Vert.* ed. 2. vi. 351. no. 35.

*Wood, Ind. Test.* pl. 7. f. 36?

*Pot. & Mich. Gall. de Douai*, p. 236. pl. 64. f. 3. 4.

*Venus Gallus*, *Spengler* (ex fide *Schroter*).

*Gmel.* p. 3277. no. 37.

*Venus* no. 14, *Schrot. Einl.* iii. 159.

*Tapes malabarica*, Sow. *jun. Thes. Conch.* p. 682. pl. 145. f. 6, 7. 8.

*Hab.* Oceanus Malabaricus, Asiaticus et Indicus

(1788) *Tapes rhombifera*.

*T.* testa ovato-transversa, inæquilaterali, compressiuscula, antice brevior at angustior, transversim regulariter tenue sulcata, flava, punctulis et lituris fuscis æqualiter aspersa; margine superiore postico convexo, antico excavato; pube lunulaque lævigatis, lineis fuscis variegatis; lunula ovato-lanceolata.

*Encycl. Meth.* pl. 282. f. 4.

*Wood, Suppl.* 2. pl. 13. f. 45.

*Venus rhombifera*, *Hanley, Descr. Cat.* p. 120.

*Hab.* Insulæ Philippinenses.

(1789) *Tapes exarata*.

*T.* testa ovato-oblonga, turgida, inæquilaterali, pallide rufa, lineis rufis angulatis reticulata, radiisque interruptis obscuris picta, liris regularibus confertissimis interstitia æquantibus sculpta; margine dorsali postico, declivi, ventrali antice ascendente; ligamento breviusculo.

*Venus exarata*, *Phil. Abbild. Conch.* p. 109. pl. 5. f. 6.

*Tapes exarata*, Sow. *jun. Thes. Conch.* p. 680. pl. 145. f. 18.

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*Hab.* Mare Rubrum? *Phil.* Mare Senegalense.

(1790) *Tapes inflata*.

*T.* testa ovata-transversa, subæquilaterali, inflata, turgida, subcordiformi, transversim regulariter sulcata, nitente, rufo-flavescente punctulis lineisve fuscis raris aspersa, obscure quadriradiata; umbonibus tumidis, recurvis, approximatis; lunula magna, ovata, lævigata, depressiuscula, concava; area ligamenti excavata, ovato-lanceolata; sulcis latis convexis; valvis intus pallide aurantis; sinu palli brevi, apice obtuso, oblique ascendente, marginibus subparalleis: sinuositate in margine posteriore sicut in *Tellinis*.

*Tapes inflata*, *Desh. Proc. Zool. Soc.* 1853.

*Hab.* Insula Ceylonensis. Coll. Cuming.

(1791) *Tapes declivis*.

*T.* testa elongato-subtrigona, subæquilaterali fulva, griseo-maculata et radiata, concentrice subundulatim costellis vix elevatis larata; margine dorsali literato, declivi, subplanulato, antice breviusculo; lunula elongata; margine ventrali antice rotundato, postice paululum emarginato (*Sow*).

*Tapes declivis*. Sow. *jun. Thes. Conch.* p. 680. pl. 145. f. 9.

*Hab.* Insulæ Philippinenses.

(1792) *Tapes lirata*.

*T.* testa solida, oblonga, rufo-fulva, radiis interruptis fuscis, lineisque in zigzag flexis pallide fuscis picta; liris transversis elevatis, angustis, interstitia superantibus sculpta; margine ventrali parum arcuato, antice subascendente, dorsali utroque rectilineo; lunulae labiis satis elevatis.

*Venus lirata*, *Phil. Abbild. and Besch.* p. 24. pl. 7. f. 5.

*Tapes lirata*, Sow. *jun. Thes. Conch.* p. 679. pl. 145. f. 19.

*Hab.* Insulæ Philippinenses.

(1793) *Tapes adspersa*.

*T.* testa ovata-transversa, inæquilaterali, compressa, antice breviori, angusta, postice oblique truncata, subangulata, transversim dense striata; postice striis lateoribus planulatis; flavicante vel aurantiaca, maculis characteribus; et nubeculis nigricantibus ornata vel subsradiata; lunula angusta, lanceolata, oblitterata.

*Venus adspersa*, Chemn. *Conch.* vii. 44. pl. 42. f. 438.

*Venus*, *Encycl. Meth.* pl. 281. f. 4.

*Venus literata*, var. D. *Dillow. Cat.* i. 203.

*Venus literata*, var. 8, *Gmel.* p. 3293.

*Venus* no. 44, *Schrot. Einl.* iii. 170.

*Venus adspersa* (ex parte), *Lamk. An. s. Vert.* v. 595. no. 37.

*Desh. in Lamk. An. s. Vert.* ed. 2. vi. 352. no. 37.

*Hanley in Wood*, (explicat tabul. p. 13) pl. 16. f. 34, (non *adspersa*, *Hanley. Descr. Cat.* p. 120).

*Tapes adspersa*, Sow. *jun. Thes. Conch.* p. 684. pl. 147. f. 52.



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*Hab.* Oceanus Indicus; insulae Philippinenses.  
(1794) *Tapes literata*.

T. testa ovata-transversali, tenui, compressa, inaequilaterali, postice latiore, oblique truncata, antice angustiore, obtusa, transversim tenui striata postice striis latioribus albo-flavicante, lineis angustis angulatis spadicis eleganter picta natibus parvis, laevibus; lunula obsoleta, angusta lanceolata; intus alba vel pallide sulphurea.

Tellina magna, *Lister. Conch.* pl. 402, f. 245.

Chama literata, *Rumph. Amb.* pl. 42, f. B.

Pelicer, *Aquat. Amb.* pl. 18, f. 2.

Valentyn, *Verhand.* pl. 13, f. 6.; pl. f. 13.

Chama, *Gualt. Ind. Test.* pl. 86, f. p.

D'Argen. *Conch.* pl. 21, f. A.

Regenss, *Conch.* pl. 4, f. 39.

Knorr, *Vergn.* i. pl. 6, f. 4.

Favanne, *Conch.* pl. 47, f. A. 1.

Encycl. *Meth.* pl. 280, f. 4.

Venus literata, *Linn. Syst. Nat.* ed. 10, p. 689; ed. 12, p. 1135; *Mus. Ulr.* ii. 508, no. 75.

Born, *Test. Mus.* p. 74.

Chemn. *Conch.* vii. 37, pl. 41, f. 432-434.

Schort. *Einl.* iii. 148.

Gmel. p. 3293, no. 132 (exclus. varietatibus).

Dillw. *Cat.* i. 203, no. 103. (exclus. var. B, C, D).

Wood, *Ind. Test.* pl. 8, f. 101.

Lamk. *An. s. Vert.* v. 596, no. 40. (exclus. var. 3).

Desh. *Encycl. Meth. Vert.* iii. 4119, no. 19; in *Lamk.* ed. 2, vi. 353.

Hanley, *Descr. Cat.* p. 121.

Pallastera literata, *Sow. Genera of Shells.* f. 2.

Reece, *Conch. Syst.* i. pl. 72, f. 2.

Tapes literata (exparte), *Sow. jun. Thes. Conch.* p. 684, pl. 147, f. 43, 45, 48.

Var. candidissima, duo specimina in collectione Cumingiana.

*Hab.* Oceanus Indicus atque Australis; insulae Philippinenses.

(1795) *Tapes radiata*.

T. testa ovato-transversa, oblonga, compressa, inaequilaterali, antice brevi, obtusa, postice oblique truncata, subangulata; transversim tenuissime striata, in latere postico striis latioribus planulatis flavo irregulariter punctulata, radiis albis et fusciscentibus subarticulatis ornata, intus pallide sulphurea.

Venus literata, radiata, *Chemn. Conch.* vii. 45, pl. 42, f. 439.

Venus no. 45, *Schrot. Einl.* iii. 172.

Venus literata, var, *Gmel.* p. 3293.

*Encycl. Meth.* pl. 282, f. 1.

Venus adspersa, *Lamk. An. s. Vert.* v. 595.

*Desh. in Lamk.* ed. 2, vi. 352, (note).

Venus aspersa, *Hanley, Descr. Cat.* p. 120, (exclus. *Dillw.* syn.).

Tapes literata, var, *Sow. jun. Thes. Conch.* p. 684, pl. 146, f. 47.

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*Hab.* Oceanus Indicus.

(1796) *Tapes turgidula*.

T. testa ovata, transversa, inaequilaterali, turgidula, antice attenuata, brevior, angustior, postice superneque rotundata; umbonibus parvis macula alba notatis; valvis rufis maculis punctisque fuscis subquadriradiata, tenue transversim sulcata; sulcis antice tenuioribus, sensim in medio et in latere postico majoribus, et postice lamellosioribus; lunula elongato-lanceolata, fusca, in longitudinem concava et striata; area ligamenti angusta, brevi, utroque latere canaliculata; lateraliter mascula fusca notata, valvis intus croceis; sinu pallii lato, parum profundo, apice obtuso, valvae sinistrae dente mediano profundissime bipartito.

Tapes turgidula, *Desh. Proc. Zool. Soc.* 1853.

*Hab.* Insulae Philippinenses. Coll. Cuming.

(1797) *Tapes rotundata*.

T. testa elongato-ovata, transversa, compressa, inaequilaterali, utroque latere obtusa, margine ventrali recto, antice ascendente, transversim regulariter sulcata, sulcis postice depressioribus, evanescentibus, flava punctulis vel lineis brevibus angulatis texturata, maculis fuscis nigrescentibus subarticulatis quadriradiata; pube lunulaeque lividis venis purpureis; transversalibus notatis; lunula lanceolata.

*Olearius, Gottorf Kunts.* p. 56, pl. 29, f. 2.

D'Argen. *App.* pl. 3, f. D.

Knorr, *Vergn.* ii. pl. 18, f. 4.

Favanne, *Conch.* pl. 49, f. 13.

Venus, *Encycl. Meth.* pl. 281, f. 3.

Venus rotundata, *Linn. Syst. Nat.* ed. 10, p. 690; ed. 12, p. 1135; *Mus. Ulr.* ii. 509, no. 76.

*Schort. Einl.* iii. 149.

*Gmel.* p. 3294, no. 134.

*Hab.* Oceanus Indicus; Madagascariensis; mare Nova Hollandia.

(1798) *Tapes sulcaria*.

T. testa oblonga, transversa, inaequilaterali, flavida vel aurantia, fulvo literata, subreticulata et radiata, transversim sulcata, sulcis distantibus, planulatis, postice sensim latioribus; latere antico brevi, angusto, declivi, latere postico elongato, oblique truncato, elongato; lunula angusta, lanceolata; margine ventrali paululum arcuato.

Venus sulcaria, *Lamk. An. s. Vert.* v. 596, no. 41.

*Desh. in Lamk. An. s. Vert.* ed. 2, vi. 254.

*Hanley, Descr. Cat.* p. 121; in *Wood. Suppl.* pl. 15, f. 50.

Tapes sulcaria, *Sow. jun. Thes. Conch.* p. 685, pl. 146, f. 30-32.

Tapes Deshayesii, var. sulphurea, *Phill. Abbild. Conch.* ii. pl. 7, f. 8. (non *Hanley*.)

*Hab.* Oceanus Indicus; Amboina.

(1799) *Tapes Deshayesii*.

T. testa oblonga, sulcis transversis angustis distantibus exarata, varii coloris, plerumque alba, fusco-reticulata, aut interrupta, radiis

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margine dorsali postico longissimo, parum arcuato, ventralique mediocriter arcuato subparallelis; extremitate postica oblique truncata; lunula lanceolata, planulata, parum distincta; area longissima, lineari-lanceolata, plana aut concava.

? *Chemn. Conch. Cab.* vii. 45. f. 439?

V. Deshayesi, *Hanley, Descr. Cat. in Wood, App.* t. 16 f. 35 (absque descript).

V. radiata, *Anton, Vert.* p. 8. no. 27 (non *Chemn. rec. Brocc.*)

Tapes Deshayesii, *Sow. jun. Thes. Conch.* p. 685. pl. 146. f. 34-38.

*Hab.* Insulae Philippinenses.

(1800) *Tapes Luzonica.*

T. testa ovali-concentrice costellis numerosis rotundatis, lyrata; rufa vel grisea, radiatim fusco maculata et variegata; lunula distincta, livida, lanceolata; margine dorsali livido, margine ventrali subrotundato (*Sow. jun.*)

Tapes Luzonica, *Sow. jun. Thes. Conch.* p. 687 pl. 149, f. 100, 101.

*Hab.* Insula Luzonica, Philippinarum.

(1801) *Tapes grata.*

T. testa ovato, transversa, inaequilaterali, compressa, antice angustiore et brevior, postice, latiore obtusa, transversim eleganter tenue sulcata, albo-flavescente, eleganter lineis fuscis tenuibus reticulata et obsolete radiata, inferne maculis majoribus albo-flavescentibus trigonis delineatis; umbonibus minimis; lunula lanceolata, breviter fusciscentem liturata; area posticali elongato-angusta, maculis transversalibus notata; valvis tenuibus, intus pallide croceis; pallii sinu horizontali, profundo, elliptico.

Tapes grata, *Desh. Proc. Zool. Soc.* 1858.

*Hab.* Insulae Philippinenses. Coll. Cuming.

(1802) *Tapes biradiata.*

T. testa ovato-transversa, tumidula, inaequilaterali, extremitatibus obtusa, flavescente, antice posticeque maculis minimis pallide fuscis grisea radiis duobus castaneis latis interruptis ornata, transversim et regulariter tenue sulcata, sulcis antice minoribus, in medio latioribus eminentioribusque, postice angustioribus et leviter undulatis; lunula livida, concava, laevigata, vix distincta; area elongato-laciniata, plana, laevigata, livida, lineis violaceis liturata, valvis intus albis; margine cardinali antice et postice violaceo maculato; sinu pallii angusto, obtuso, marginibus parallelis.

Tapes biradiata, *Desh. Proc. Zool. Soc.* 1853.

Var. Testa minore, turgidior radiis evanescentibus; valvis maculis minimis et lineis angulosis irregularibus ornata.

*Hab.* Putao, Philippinarum. Coll. Cuming.

(1803) *Tapes quadriradiata.*

T. testa transversa, elliptica turgidula, inaequilaterali, utroque latere-obtusa antice angustiuscula albo-lutea, lineis fuscis angulatis, numerosis densissime picta et quadriradiata; radiis maculis quadratis fuscis et albis subarticulatis; striis

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transversis regularibus numerosis depressiusculis postice planis et latioribus; lunula, fusca-violascente elongato-angusta, polita, fusco dense lineolata; area angusta, excavata, in medio macula violaceo-livida notata; valvis intus pallide luteis; sinu pallii lato, semielliptico.

Tapes quadriradiata, *Desh. Proc. Zool. Soc.* 1853.

*Hab.* Insulae Philippinenses. Coll. Cuming.

(1804) *Tapes undulata.*

T. testa ovato-oblonga, pallide fulva, inferne violascente, lineis rufis aut violaceis angulato-fluosis reticulata, levi, lineis tamen impressis margini ventrali subparallelis, undulatis utrumque latus non attingentibus exarata; caeterum T. textili similis.

Venus undulata, *Born. Test. Mus.* p. 67.

*Dillw. Cat.* p. 204. no. 106. (pro Borni. synonymo).

Venus rimosa, *Phil. Zeits. fur. Malac.* 1847, p. 88; *Abbild. Conch.* p. 25. pl. 7. f. 7

Tapes rimosa, *Sow. jun. Thes. Conch.* p. 682, pl. 146, f. 29.

*Hab.* China (Cuming.)

(1805) *Tapes texturata.*

T. testa ovato-transversa, tenui, inaequilaterali tumidiuscula, transversim tenue striata, flava fusco reticulatim picta, intus aurea; lunula ovato-lanceolata, saepius fuliginosa.

Venus textrix, var, *Chemn. Conch.* vii. pl. 42. f. 443.

Venus texturata, *Lamk. An. s. Vert.* v. 597, no. 43. *Desh. in Lamk. ed. 2. vi.* 355, no. 43. *Hanley, Descr. Cat.* p. 124; *in Wood, Ind. Suppl.* pl. 15. f. 52.

Tapes texturata, *Sow. jun. Thes. Conch.* p. 690, pl. 149, f. 111.

*Hab.* Oceanus Indicus (Lamk.); mare Mediterraneum.

(1806) *Tapes acuminata.*

T. testa T. floridedellae simili, sed laevigata; fulva, maculis fuscis punctata et radiata. (*Sow. jun.*)

Tapes acuminata, *Sow. jun. Thes. Conch.* p. 689, pl. 149, f. 105.

*Hab.* —?

(1807) *Tapes indica.*

T. testa subrhombidea, fulva, fusco maculatim radiata, intus aurantia; sulcis acutis, numerosis, inaequalibus radiatis, et costellis concentricis, ad latera, elevatis, et postice costellis radiatis, angulatis serratis, decussata; latere postico oblongo, subtruncato; margine dorsali subdeclivi, depresso, literato; latere antico brevi, declivi, lunula magna, ovali griseo literata; margine ventrali paululum arcuato.

Tapes indica, *Sow. jun. Thes. Conch.* p. 694, pl. 151. f. 146, 147.

*Hab.* Oceanus Indicus; insulae Philipinenses.

(1808) *Tapes punicea.*

T. testa ovato-transversa, inaequilaterali, con-



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vexiuscula antice breviori obtusa, attamen attenuata, latere postico lateore obscure subtruncato-fulva vel fusco punctata irregulariter saturatiore radiata maculis albis minimis irregulariter irrata, longitudinaliter tenue sulcata sulcis inaequalibus postices latioribus, aliquando duplicatis sulcis transversis decussatis in medio simplicibus lunula vix perspicua oblongato-lanceolata, per longitudinem striata, vulvis intus vivide roseo purpureis, margine cardinali postico violaceo maculato, sinu pallii lato, parum profundo.

*Tapes punicea*, Desh. *Proc. Zool. Soc.* 1853.

*Tapes variegata* (ex parte), Sow. jun. *Thes. Conch.* p. 696. pl. 151. f. 134. 135.

*Hab.* Insulae Philippinensis. Coll. Cuming.

(1809) *Tapes variegata*.

T. testa ovali, aureo, fusco et violaceo variegata, costellis radiantibus minutis et striis concentricis minutissimis decussata, margine ventrali arcuato.

*Tapes variegata*, Sow. jun. *Thes. Conch.* p. 696. pl. 151. f. 133-138.

*Hab.* Insulae Philippinenses.

(1810) *Tapes Philippinarum*.

T. testa oblongo-ovata, antice, truncata, fulva fusco, variegata, obscure radiata, radiatim lirata, liris numerosis, subundatis, ad latera decussatim nodulosis, intus partim violacea.

*Venus Philippinarum*, Adams. & Reeve. *Voy. Smar.* p. 79. pl. 22. f. 10.

*Tapes Philippinarum*, Sow. jun. *Thes. Conch.* p. 194. pl. 151. f. 139-141.

*Hab.* Insulae Philippinenses.

(1811) *Tapes japonica*.

T. testa ovato-transversa, angusta, turgidula, inaequilaterali, antice angusta, obtusa, postice subtruncata, longitudinaliter tenue striata, striis inaequalibus, posticis et anticis latioribus, striis transversis decussatis et granulosis, lunula vix perspicua, ovato-lanceolata; area minima plana, laevigata, valvis albo-griseis, maculis magnis irregularibus rufis in latere postico marmoratis-intus pallide flavidis; sinu pallii brevi, obtusobasi dilatato.

*Tapes japonica*, Desh. *Proc. Zool. Soc.* 1853.

*Hab.* Mare Japonicum, Coll. Cuming.

(1812) *Tapes Brugueri*.

T. testa oblonga, subrhomboidea, griseo-fulva ad umbones violacea vel fulva, albo biradiata, maculis fuscis radiis marginatis; longitudinaliter tenue costellata, costellis in medio simplicibus, planulatis, postice latioribus subserratis antice decussatis; latere antico brevi, postico oblongo, subangulato, truncato, margine dorsali et margine ventrali rectis, parallelis.

*Venus*. *Encycl. Meth.* pl. 283. f. 4.

*Venus Brugueri*, Hanley, *Proc. Zool. Soc.* 1845. p. 21. in *Wood. Ind. Suppl.* pl. 15. f. 59.

*Tapes Brugueri*, Sow. jun. *Thes. Conch.* p. 696. pl. 151. f. 130. 131.

*Hab.* Ceylon.

## MOLLUSCA.

(1813) *Tapes Cumingii*.

T. testa elongata, compressa, grisescente, fusco postice virgulata, antice interruptim radiata, postice elongata, gradatim angustata ad terminum acuminata, antice brevi, rotundata, paululum ascendente, omnino minute divaricatim, striata.

*Tapes Cumingii*, Sow. jun. *Thes. Conch.* p. 690. pl. 150. f. 128.

*Hab.* Insulae Philippinenses.

*Venerupis*, Syn. *Gastrana*. rec. 19 sp. also fossil.

(1814) *Venerupis tenuistriata*.

V. testa ovata, transversa, æquivalvi, inaequilaterali, alba, striis radiantibus tenuibus unguulatis, sulcis incrementi distantibus decussatis, concinne sculpta; lateribus rotundatis, marginibus dorsali et ventrali parallelis leviterque arcuatis lunula nulla, ligamento longo, prominente, umbonibus parvis, acutis; cardine utriusque valvæ dentibus tribus compressis; impressionibus musculorum magnis, rotundis sinu palliari lato, profundo, semilunari.

*Venerupis tenuistriata*, Jones, *Proc. Zool. Soc.* 1846. p. 35.

*Hab.* Singapore (Jonas).

(1815) *Venerupis monstrosa*.

V. testa ovato-transversa subæquilaterali, tumida inaequivalvi, albo-grisea, intus flava, violaceo maculata, transversim densissime striato-lamellosa, striis longitudinalibus crispata; valva dextra, sinistram superante tam ad cardinem quam postice.

*Venus monstrosa*, Chemn. *Conch.* vii. 50. pl. 42. f. 445, 446.

*Gmel.* p. 3280. no. 53.

*Dillow. Cat.* 1. 208. n. 113.

*Wood. Ind. Test.* pl. 8. f. 112.

*Venus* no. 50, Schrot. *Einkl.* iii. 173

*Corbula*, Brug. *Encycl. Meth.* pl. 230. f. 2. (copiee de Chemnitz).

*Venerupis monstrosa*, Gray. *Ann. Phil.* p. 25.

*Hanley. Descr. Cat.* p. 55.

*Hab.* Insulae Nicobaricae; insulae Philippinenses.

*Petricola*. Syn. *Rupellaria*. *Choristodon*. *Narano*. rec. 30 sp. fossil 12 sp.

(1816) *Petricola bipartita*.

P. testa elongato-subtrigona, antice turgida, obtusa, brevi, postice attenuata, subangulata, cuneiformi, intus extusque candidissima, longitudinaliter striata; striis in latere antico multo tenuioribus divisis, divaricatis; irregulariter inter se conjunctis, in medio regularibus, sensim in latere postico crassioribus; valvis tenuibus dentibus cardinalibus; inaequalissimis, uno in utraque valva magno robusto; sinu pallii trigonobasi lato, in medio valvarum posito.

# MOLLUSCA.

*Petricola bipartita*, *Desh. Proc. Zool. Soc.* 1853.

*Hab.* Insula Samar Philippinarum. Coll. Cuming.

(1817) *Petricola chinensis*.

P. testa ovato-subtrigona, antice obtusa, turgidiore, brevi, lævigata, postice attenuata, in medio et postice longitudinaliter sulcata, sulcis undulatis convexis interstitiis latioribus, umbonibus, minimis, oppositis, separatis; ligamento magno, crasso; cardinalibus dentibus inaequalibus arcuatis sinu palli magno, lato, basi obliquissimo.

*Petricola chinensis*, *Desh. Proc. Zool. Soc.* 1853.

*Hab.* Mare Chinense. Coll. Cuming.

(1818) *Petricola nivea*.

P. testa ovali, nive caudidiori subdiaphana, longitudinaliter dense striata; cardine lineari simulque dentato (*Chemnitz*)

*Mytilus niveus*, *Chemn. Conch.* viii. 154 pl. 81. f. 734.

*Gmel.* p. 3353, no. 27.

*Dillw. Cat.* i. 307, no. 17.

*Wood, Ind. Test.* pl. 12. f. 16.

*Petricola nivea*, *Gray, Ann. Phil.* xxv.

*Hanley, Descr. Cat.* p. 53.

*Hab.* Insulae Nicobaricae (*Chemnitz*.)

(1819) *Petricola cultellus*.

P. testa elongato-angusta, transversa, pholidiformi, lateraliter compressiuscula, inferne convexo-arcuata; antice brevi posticeque obtusa, hiant, albo-squalide rufescente longitudinaliter striata et costata, costis in latere antico divaricatis, angustis, squamulis fornicatis exasperatis; striis in medio posticeque tenuibus, undulosis, striis incrementi irregularibus interruptis; umbonibus tumidulis approximatis lævigatis, valvis intus candidissimis; sinu palli elongato, angusto, apice obtuso.

*Petricola cultellus*, *Desh. Proc. Zool. Soc.* 1853.

*Hab.* Ceylon. Coll. Cuming.

(1820) *Narano divaricata*.

N. testa ovato-oblonga, maxime inaequilaterali, turgida, alba, utraque extremitate obtusa, antice brevissima; tenuissime striata, striis angulatis et divaricatis subtilissimis; sinu palli brevi, trigono, postice latissime aperto.

*Venus divaricata*, *Chemn. Conch.* x. 357, pl. 172. f. 1666, 1667.

*Venus divergens*, *Gmel.* p. 3269, no. 147.

*Dillw. Cat.* i. 191. no. 74.

*Wood, Ind. Test.* pl. 8. f. 73.

*Petricola lucinalis*, *Lamk. An. s. Vert.* v. 504. no. 4.

*Gray, in Griffith Anim. Kingd.* pl. 39. f. 13.

*Hanley, Descr. Cat.* p. 52.

*Petricola divaricata*, *Desh. in Lamk. An. s. Vert.* ed 2. vi. 157. no. 4.

# MOLLUSCA.

(1821) *Narano radiata*.

N. testa elliptica, transversa, depressiuscula, inaequilaterali, intus extusque candidissima, radiatim costellata costellis ad apices tenuibus undulatis postice granulosis; latere antico rotundato, postice longiore; cardine in medio emarginato, dente medio valvulae sinistrae canaliculato.

*Narano radiata*, *Gray, Ann. & Mag. Nat. Hist.* 1853, xi 38.

*Hab.* Mare Japonicum.

*Glaucomya*. *Syn. Glaconome*, rec. 11 sp.

*Glaucomya*. Malacca.

*Glaucomya*. Malacca.

*Glaucomya*. Malacca.

(1822) *Glaconome Chinensis*.

G. testa ovato-oblonga, subventricosa, tenui postice obtusa, antice angulata, in utraque valva tridentata, epidermide fusco virescente; intus alba.

*Glaconome Chinensis*, *Deless. rec. de Cog.* pl. 19. f. 5. a. b.

*Hanley, Descr. Cat.* p. 17.

*Reeve, Conch. Syst.* i pl. 31. *Conch. Icon.* pl. 1. f. 1.

*Sow. Gen. of Shells*, no. 42. f. 1. 2; *Zool. of Beechey's Voy.* p. 153; *Conch. Man.* p. 153. f. 64.

*Hab.* Flumina China.

(1823) *Glaconome rugosa*.

G. testa elongato-oblonga, inaequilaterali, subventricosa, rugosa, circiter umbones plus minusve erosa, latere antico, rotundato; epidermide peculiariter corrugata, latere postico subobsolete angulato, attenuato, hiant; sinu palli prælongo angustissimi moque, apice acuto.

*Glaconome rugosa*, *Reeve, Conch. Icon.* pl. f. 4. a, b; *Proc. Zool. Soc.* 1844, p. 19.

*Wood, Ind. Test. Suppl.* 2. pl. 10. f. 24.

*Hab.* Ad oras fluviorum in sinu Manillæ.

(1824) *Glaconome cerea*.

G. testa oblongo-ovata, pallide straminea, subtilissime striata, lateribus rotundatis, postico subangulato-attenuato; valvis tenuibus, intus lacteis; sinu palli profundo, trigono, basi lato; apice acutissimo, vix perspicuo.

*Glaconome cerea*, *Reeve, Proc. Zool. Soc.* 1844, p. 21; *Conch. Icon.* pl. 1. f.

*Cutlow, Conch. Nom.* p. 6. no. 28.

*Hab.* Flumen Gangeticum.

(1825) *Glaconome curta*.

G. testa ovata, curta, subaequilaterali, tenui, subtilissime striata, ad umbones paululum erosa lateribus rotundatis, intus cæruleo-carneo tincta cardine angustissimo tridentato; dentibus minimis compressis, apice profunde bifidis; sinu palli, brevitrigono, obliquo.

*Glaconome curta*, *Reeve, Proc. Zool. Soc.* 1844. p. 20; *Conch. Icon.* pl. 1. f. 7.

*Wood, Ind. Test. Suppl.* 2. pl.—? f.—?



## MOLLUSCA.

*Callow, Conch. Nom.* p. 6. no. 5.

*Hab.* In aquis dulcibus regionis Agoon dictæ Insule Luzon Philippinarum.

(1826) *Glaucanome radiata*.

G. testa oblongo-ovata, compressiuscula, corneo; purpureo radiata; epidermide viridescente prope marginem induta, latere antico rotundato, postico subacuminato; valvis tenuissime transversim striatis, intus violaceis; sinu pallii profundo, angusto, apice obtuso, marginibus parallelis.

*Glaucanome radiata, Reeve, Proc. Zool. Soc.* 1844, p. 20; *Conch. Icon.* pl. 1. f. 5.

*Callow, Conch. Nom.* p. 6, no. 6.

*Hab.* Flumen San Nicolas in insula Zebu Philippinarum.

(1827) *Glaucanome angulata*.

G. testa elongato-oblonga, striata, circiter umbones plus minusve erosa, latere antico rotundato, postico angulato, carina obtusa de umbonibus ad margines decurrente; valvis tenuibus, intus albis vel violaceis; dentibus cardinalibus compressis, duobus medianis bifidis, sinu pallii elongato, angusto, obliquo, marginibus suis parallelis.

*Glaucanome angulata, Reeve, Proc. Zool. Soc.* 1844, p. 20; *Conch. Icon.* pl. 1. f. 6.

*Callow, Conch. Nom.* p. 6. no. 1.

*Hab.* Flumen Jinigaram in insula Negros Philippinarum.

(1828) *Glaucanome straminea*.

G. testa subelongato-ovata, æquilaterali, ventricosa, circiter umbones erosa, latere antico rotundato, tenue striato, postico subattenuato, leviter angulato, transversim plicato; epidermide nitida, viridescente straminea; valvis intus albis; sinu pallii profundissimo, angusto, acuminato.

*Glaucanome straminea, Reeve, Proc. Zool. Soc.* 1844, p. 20; *Conch. Icon.* pl. 1, f. 2.

*Callow, Conch. Nom.* p. 7. no. 8.

*Hab.* Ad oras fluviorum in sinu Manillæ.

(1829) *Glaucanome rostralis*.

G. testa elongato-angusta, depressa, subæquilaterali, tenui, viridi, antice obtusa, in medio dilatata, postice attenuata, angulata, subrostrata; latere antico transversim irregulariter striato, postico sulcato; valvis intus albis, ad marginem fusco-rubente pallide pictis, postice zonula unica obliqua notatis; sinu pallii angusto, profundissimo, leviter arcuato, lateribus suis parallelis, apice obtuso.

*Glaucanome rostralis, Desh. Proc. Zool. Soc.* 1853.

*Hab.* Borneo. Coll. Cuming.

### Family III. Mytilidæ. Mussels.

Genera. *Mytilus*, Sea-mussel, *rec.* 50 sp. *fossil* 80 sp. ? *Mytilina*, *fossil*, 6 sp.

*Modiola*, Horse-mussel, *rec.* 50. sp. *fossil* 130 sp. *Modiola emarginata*, B. *Calcutta*.

### Family XII. Cycladidæ.

Genera. *Cyclas*, *Syn.* *Sphærium*. *Pisum*. *Musculium*, *rec.* 30 sp. *fossil*, 35 sp.

## MOLLUSCA.

### Family XV. Mactridæ.

Genera. *Mactra*, *Syn.* *Trigonella* *Schizodesma*.

*Spisula*, *Mulinia*, *rec.* 60 sp. *fossil*, 30 sp.

*Mactra violacea*, Malacca.

*Mactra*, Ceylon.

*Mactra*, Ceylon.

*Mactra*, Singapore.

*Mactra*, Ceylon.

*Mactra Reevsii*, Malacca.

*Mactra*, variety, Madras.

*Mactra*, Madras.

*Mactra spengleri*, Cape of Good Hope.

*Mactra plicataria*, Indian Ocean.

*Mactra papyracea*, Nicobar Islands.

*Mactra vitrea*, Ceylon.

*Mactra striatula*.

*Mactra cygnea*, Tranquebar.

*Mactra maculata*, Nicobar Islands.

*Mactra turgida*, Tranquebar.

*Mactra violacea*, Tranquebar.

*Mactra cuneata*, Tranquebar.

*Mactra lactea*, Tranquebar.

*Mactra achatina*, Tranquebar.

*Mactra complanata*, Tranquebar.

*Mactra sublicata*, (sup-

ple), Tranquebar.

*Mactra tafrobaucensis*

(supple). Ceylon.

*Sub-genus*, *Sowerbya*, *fossil*.

*Gnathodon*, *Syn.* *Rangia*, *rec.* 1 sp. *fossil* 1 sp.

*Lutraria*, Otter's-shell, *rec.* 18 sp. *fossil* 10 sp.

*Anatinella*, 3 sp.

### Family XVI. Tellinidæ The Tellens.

Genera. *Tellina*, *Tellen*, *Syn.* *Peronaca*, *Phyloda*, *Omala*.

*Tellina gargadia*, Indian Ocean.

*Tellina linguaselis*, Indian Ocean.

*Tellina angulata*, South America and India.

*Tellina*, Indian Ocean.

*Tellina*, Eur. Ocean and Caspian Sea.

*Tellina rugosa*, India and South America.

*Tellina multangula*, Tranquebar.

*Tellina foliacea*, Indian Ocean.

*Tellina*?, Pulicat.

*Tellina virgata*, East Indies.

*Tellina vulsellæ*, Mus. Brit. Singapore.

*Tellina*, Malacca.

*Tellina*, Singapore.

*Tellina restrata*, Indian Ocean.

*Tellina* 19 „

*Tellina radiata*.

*Tellina virgata*.

*Tellina rostrata*.

*Tellina lanceolata*.

*Tellina lingua felix*.

*Tellina gargadia* and eleven others.

*Tellina lævigata*.

Europe and India.

# MOLLUSCA.

<i>Tellina truncata</i> .	Java.
<i>Tellina trilatera</i> .	Java.
<i>Tellina spengleri</i> .	Indian Ocean.
<i>Tellina operculata</i> .	Indian Ocean.
<i>Tellina hyalina</i> .	Indian Ocean.
<i>Tellina lanceolata</i> .	India.
<i>Tellina opalina</i> .	India.
<i>Tellina pectinata</i> .	East Indies.
<i>Tellina strigosa</i> .	Moluccas.
<i>Tellina scobinata</i> .	Indian Ocean.
<i>Tellina Remies</i> .	India and America.
<i>Tellina polygona</i> .	Indian Ocean.
<i>Psammotea</i> . Arcopagia, <i>rec.</i> 20 sp. <i>fossil</i> , 130 sp.	
<i>Diodonta</i> . <i>Syn.</i> <i>Fragilia</i> , <i>rec.</i> 3 sp. also <i>fossil</i> .	
<i>Capsula</i> . <i>Syn.</i> <i>Capsa</i> , <i>rec.</i> also <i>fossil</i> , 4 sp.	
<i>Psammobia</i> . Sunset shell. <i>Syn.</i> <i>Psammotea</i> .	
<i>Psammocola</i> . Gari, <i>rec.</i> 40 sp. <i>fossil</i> , 25 sp.	
<i>Sanguinolaria</i> . <i>rec.</i> 20 sp. <i>fossil</i> , 30 sp.	
<i>Sanguinolaria</i> .	Malacca.
<i>Sanguinolaria</i> .	Aden.
<i>Semele</i> . <i>Syn.</i> <i>Amphidesma</i> . <i>rec.</i> 40 sp. <i>fossil</i> 10 sp.	
<i>Sub-genera</i> . <i>Cuningia</i> . <i>rec.</i> 10 sp. also <i>fossil</i> .	
<i>Syndosmya</i> . <i>rec.</i> also <i>fossil</i> 6 sp.	
<i>Scrobicularia</i> . <i>rec.</i> also <i>fossil</i> .	
<i>Mesodesma</i> . <i>Syn.</i> <i>Eryx</i> . <i>Paphia</i> . <i>Erycina</i> .	
<i>Donacille</i> , <i>rec.</i> 40 sp. <i>fossil</i> 7 sp.	
<i>Mesodesma</i> .	Malacca.
<i>Sub-genus</i> . <i>Anapa</i> .	
<i>Ervilia</i> . Lentil-shell, <i>rec.</i>	
<i>Donax</i> . Wedge-shell. <i>Syn.</i> <i>Chione</i> . <i>Cuneus</i> .	
<i>Capisterium</i> . Latona and Hecuba. <i>Egeria</i> <i>rec.</i> 45 sp. <i>fossil</i> 30 sp.	
<i>Donax scortum</i> .	East Indies.
<i>Donax pubescens</i> .	Amboyna.
<i>Donax rugosa</i> .	South Ocean.
<i>Donax serra</i> .	Tranquebar.
<i>Donax scortum</i> .	Madras.
<i>Donax spinosa</i> .	Tranquebar.
<i>Donax incarnata</i> .	Tranquebar.
<i>Donax cuneata</i> .	East Indies.
<i>Donax lævigata</i> .	Tranquebar.
<i>Donax scripta</i> .	East Indies.
<i>Donax faba</i> .	Coast of Malabar.
<i>Donax radiata</i> .	Tranquebar.
<i>Donax muricata</i> .	Indian Ocean.
<i>Donax candida</i> .	Tranquebar.
<i>Donax stultorum</i> .	Indian Seas.

## (1830) *Chione plicata*.

C. testa ovato-transversa, subquadrangulari, obliqua, inequilaterali, depressiuscula, purpurascens, lamellis membranaceis transversalibus numerosis postice angulatis cincta; in angulis lamellis prominentioribus; umbonibus depressis, approximatis, valde inflexis; lunula impressa, cordiformi, purpurea; area elongata, lata, depressa, angulo squamato circumdata, valvis intus albis; sinu palli parvo, triangulari, horizontali, apice obtusiusculo.

*Favanne, Conch.* pl. 47. f. E. 7.

*Malesian's Verhad.* pl. 15. 21.

# MOLLUSCA.

*Venus lamellata*, *Born, Mus.* p. 61, pl. 4. f. 9.  
*Chama venerca*, *D'Argen. Conch.* pl. 21, f. K.  
*Venus foliaceo-lamellosa*, *Chemn. Conch.* vi. 299. pl. 28. f. 295-297.

*Venus Encycl. Meth.* pl. 275, f. 3. a. b.

*Venus plicata*, *Gmel.* p. 3276. no. 30.

*Dillw Cat.* i. 162. no. 9.

*Wood, Ind. Test.* pl. 7. f. 9.

*Lamk. An. s. Vert.* v. no. 11.

*Desh. Encycl. Meth. Vers.* iii. 1115. no. 8; in *Lamk. ed.* 2. vi. 341. no. 11.

*Reeve. Conch. Syst.* i. 68, f. 6.

*Hanley, Descr. Cat.* p. 111.

*Sow. jun. Thes. Conch.* p. 725. pl. 160, f. 174.

*Hab.* *Littus Senegalense*; *Oceanus Indicus*? (1831) *Chione calophylla*.

C. testa ovato-trigona, inequilaterali, obliqua, depressa, alba, lamellis tenuibus transversis latis distantibus roseo maculatis cincta, pube interruptis; lunula cordiformi, squamis latis prominentibus circumpata; pube excavata, marginibus tenne crenulatis.

*Valentyn Amb.* pl. 16. f. 29.

*Venus calophylla*, *Hanley, in Wood, Ind. Suppl.* pl. 16. f. 26.

*Sow. jun. Thes. Conch.* p. 724, pl. 160, f. 176.

*Venus tiara*. *Reeve, Conch. Syst.* i. pl. 67. f. 3 (non *Dillw.*)

*Hab.* *Oceanus Indicus* et *Chinensis*; *Australia* (*Jukes*)

(1832) *Chione tiara*.

C. testa ovato-trigona, subcordata, compressa, alba, rubro-violascente triradiata; lamellis acutis, tenuibus, latis, erectis, distantibus, transversaliter instructa, lamellis in latere postico depressis et in margine pube prominentibus; lunula ovata, depressa; marginibus tenuibus crenatis; latere postico intus violaceo.

*Concha Veneris orientalis*, *Chemn, Conch.* vi. 290. pl. 27. f. 279-281.

*Quall. Ind. Test.* pl. 88. f. D.

*Encycl.* pl. 375. f. 4. a. b.

*Venus tiara*, *Dillw. Cat.* i. 162, (exclus. plur. syn.)

*Desh. Lamk. An. s. Vert.* 2d. 2. vi. 372. no. 91.

*Hanley, Descr. Cat.* p. 112; *Wood, Ind.* pl. 7. f. 8.

*Sow. jun. Thes. Conch.* p. 723. pl. 158. f. 125 126 (exclus. alteris).

An eadem var.? *Venus foliacea*, *Phil. Abbild. Conch.* p. 17. pl. 5. f. 1.

*Hab.* *Oceanus Indicus*; *Nova Hollandia*.

(1833) *Chione foliacea*.

C. testa cordato-trigona, tumida, solida, albidula, radiis rubentibus picta; lamellis transversis foliaceis, surrectis circa 15, antice incisus et in lobum productis, postico in angulum fractis, sursum flexis, præsertim in valvula dextra sinu divisus; lunula cordata, area lanceolata; margine crenulato.



# MOLLUSCA.

Venus foliacea, *Phil. Abbild. Conch.* ii. 17. pl. 5. f. 1.

Venus thiara, var, *Sow. jun. Thes. Conch.* p. 723, pl. 158, f. 127, 128.

*Hab.* Mare Rubrum; littus Madagascariense. (1834) *Chione elegans*.

C. testa oblongo-ovata, calcareo-alba, lamellis concentricis subirregularibus ad latus posticum majoribus ornata, lunula, cordata, parva.

Venus elegans, *Adams & Reeve Voy. Samarang.* p. 79. pl. 24 f. 13 *Sow. jun. Thes. Conch.* p. 731. pl. 158. f. 133.

(1835) *Chione Isabellina*.

C. testa cordata, subtriangulari, isabellina lamellis transversis angustis, erectis, antice interruptis, in margine area abrupte terminatis sculpta; extremitate postica acute angulata; lunula ovata, compressa, striata area magna, lanceolata, laevi; pagina interna lactea margine crenulato.

Venus Isabellina, *Phil. Zeits. fur. Malak.* 1848. p. 188, no. 65; *Abbild. and Besch.* p. 39. pl. 10. f. 5.

*Hab.* Mare Chinense.

(1836) *Chione chlorotica*.

C. testa orbiculari, subtrigona, flavo-albida, lamellis transversim angustis, antice sinu subinterruptis sculpta; lunula parva, cordata, compressa; area magna, lanceolata, laevi, pagina interna lactea, margine crenulato.

Venus chlorotica, *Manke, Zeits. fur Malak.* 1848, p. 186. no. 63. *Phil. Abbild. and Besch.* p. 38. pl. 10. f. 3.

*Hab.* China.

(1837) *Chione marica*.

C. testa subcordata; sulcis longitudinalibus striisque transversis decussata, albida, fusco maculata; pube appendicibus squamiformibus utrinque marginata,

Venus marica, *Linn. Syst. Nat.* p. 1130.

*Gmel.* p. 3262, no. 3.

*Schrot. Einl.* iii. 112.

*Chemn. Conch.* vi. t. 27. f. 282-284; junio? 285, 286.

*Encycl.* pl. 275. f. 2. a. b.

*Dillow. Cat.* i. 160, no. 5.

*Wood, Ind. Test.* pl. 7. f. 5.

*Desh. Encycl. Meth. Vert.* iii. 1119, no. 11; in *Lamk. An. s. Vert.* ed. 2. vi. 345. no. 16.

*Hanley, Descr. Cat.* p. 114.

*Politiez et Much. Cat. Conch.* p. 238. no. 30.

*Sow. jun. Thes. Conch.* p. 719, pl. 157. f. 107, 110.

*Hab.* Oceanus Indicus; insulae Philippinenses.

(1838) *Chione costellifera*.

C. testa oblongoovata, subtrigona, subaequilaterali, alba, rubro sparsim variegata, longitudinaliter costata, costis confertis, decussatim plicatis plicis semilunaribus, confertis, posticis squamulosis.

Venus costellifera, *Adams. & Reeve, Voy. Samarang,* p. 79. pl. 21. f. 18.

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*Sow. jun. Thes. Conch.* p. 718. pl. 157.

*Hab.* Insulae Philippinenses.

(1839) *Chione scabra*.

C. testa ovato cordata, inaequilaterali, subventricosa, pallide brunnea, radiatim costellata; costellis confertis et concentricis squamiferis; margine ventrali valde arenato; dorsali utrinque convexiusculo et antice brevi; natibus acutis et antice incumbentibus; lunula subinconspicua; pube laud excavata; superficie interna, livida et postice saturatius tincta, margine interno crenato.

Venus scabra, *Wood, Ind. Test. Suppl.* pl. 1<sup>c</sup>. f. 24. *App.*

*Hanley, Proc. Zool. Soc.* 1844, p. 161.

*Sow. Thes. Conch.* p. 718. pl. 157, f. 101, 102.

*Hab.* Insulae Philippinenses; Novo Hollandia.

(1840) *Chione decorata*.

C. testa cordato trigona, antice brevior, postice productiore, flavescens alba, lineisque aurantis elegantissime radiatim picta, costis radi. antibus lamellisque transversis undulato crispis costis decussantibus concinne sculpta; lunula oblongo cordata, valvae lanceolata squamoso-costatis furcis; intus alba, nitida, cardine valvae dextrae dentibus tribus, sinistrae duobus; margine ventrali denticulato; denticulis 4 posticis magnis reliquis minoribus.

Venus decorata, *Bord. et Sow. Proc. Zool. Soc.* 1835, p. 49.

*Sow. Beech. Voy. Moll.* p. 151. pl. 41. f. 9

*Hanley, Descr. Cat.* p. 117; in *Wood. Suppl.* pl. 16. f. 49.

Venus bella, *Jonas, Mall. Beitr.* p. 17. pl. 8. f. 8, 8 a.

*Phil. Abbild. Conch.* p. 62. pl. 4. f. 4.

*Hab.* Singapore; insulae Moluccenses.

(1841) *Chione Cochinesis*.

C. testa ovali-subcordata, parva, postice subangulata, pallide fulva, vel grisea, prope umbones livida, postice valde colorata, costis squamiferis rotundatis validis radiata, interstitiis angustatis.

Venus Cochinesis, *Sow. jun. Thes. Conch.* p. 716. pl. 1866. 79, 80.

*Hab.* Mare Chinense.

(1842) *Chione aspera*.

C. testa ovali, tumida, postice elongata, albo nigro variegata, granulosa, longitudinaliter transversimque striata; intus albidolutescente, apice nigro.

Venus aspera, *Quoy. & Gaim. Voy. de l'As-trol.* iii. 524, no. 3. pl. 84. f. 3. 4.

*Hab.* Nova Guinea, in portu Dorey dicto.

(1843) *Chione discors*.

C. testa obovali, crassiusculata, radiatim confertim striata antice rugis decussata, alba, fusco-nigricante instrata, coloribus valvae alterae diversimodo ordinatis; linea dorsali elevatiuscula; intus alba, postice violaceo tincta margine ventrali crenulato.

# MOLLUSCA.

Venus discors, *Sow. Proc. Zool. Soc.* 1834, p. 42.

*Hanley, Descr. Cat.* p. 118; in *Wood, Suppl.* pl. 15, f. 60.

*D'Orb. Voy. en Amer. Moll.* p. 563.

Tapes discors, *Sow. jun. Thes. Conch.* p. 668. pl. 151, f. 145-150.

*Hab.* America meridionalis et centralis.

(1844) *Chione tessellata*.

C. testa ovato-transversa, solida, turgidula, inaequilaterali, pallide flavo obscuriore vel fusco radiata et tenue livurata, antice obtusa, postice subtruncata, transversim dense et inaequaliter sulcata, longitudinalibus sulcis decussata, sulcis postice, apicibusque obtuse denticulatis; valvis, intus, atro-violaceis, fornice rubescente; dentibus cardinalibus albis divaricatis; marginibus tenue et inaequaliter denticulatis.

Venus tessellata, *Adams & Reeve, Voy. Samar.* p. 79. pl. 22, f. 11.

Tapes tessellata, *Sow. jun. Thes. Conch.* p. 697. pl. 151, f. 142, 143.

*Hab.* Insulae Philippinenses.

(1845) *Chione subnodulosa*.

C. testa ovata, crassiuscula, subaequilaterali, satis convexa, concentricè costata; costis confertis, antice mediaque obtusis, postice in brevibus lamellis conversis, undique a sulcis radiantibus decussatis; margine ventrali convexo, ante subarcuato; dorsali, utrinque stibideclivi, pube et lunula oblongo-cordata, prominentibus; ligamento infosso, angustissimo; margine interno undique crenulato, superficie interna purpureo picta.

Venus subnodulosa, *Hanley, Proc. Zool. Soc.* 1844, p. 150.

*Wood, Ind. Test. Suppl.* pl. 16, f. 19. App.

Var. a Testa albida, livido brunneo variegata.

Var. a Testa fulvo fuscescente, natibus albidis, sulcis subremotis.

*Hab.* Insulae Philippinenses.

(1846) *Chione Cor.*

C. testa ventricosissima, rotundata, albida, pidermide tenui, fulva induta, iris numerosis irregularibus subundulatis rotundatis cineta; latere postico magno; margine dorsali elevato; area depressa, striata; latere antico parvo; breviangusto, prope umbones concavo; lunula indistincta; margine inferiore levigato.

Venus Cor, *Sow. jun. Thes. Conch.* p. 727. pl. 160, f. 184.

*Hab.* Mare Indicum, loco. Kurachee dicto.

(1847) *Chione striata*.

C. testa ovato-trigona, inaequilaterali, turgida, antice obtusa, postice declivi et angulata, aetate flexuso-rostrata, straminea, aliquantisper lineis fuseis angulatis ornata; lunula lata, ovata, plana, laevigata, livida, sub apicibus violaceo maculata; area angusta, elongato-lanceolata; umbonibus tumidis; valvis extus regulariter transversim striato-sulcatis, intus croceis; sinu pallii parvo,

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Venus striata, *Chemn. Conch.* vi. 358, pl. 34, f. 264, 366.

*Gmel.* p. 3279, n. 49.

*Dillw. Cat.* i. 188, n. 57.

*Hanley, Descr. Cat.* p. 127.

*Wood, Ind. Test.* pl. 7, f. 56.

Venny no 21, *Short Einl.* iii. 164.

Venus labuana, *Adams & Reeve, Voy. Samar.* p. 79. pl. 21, f. 16. *Sow. jun. Thes. Conch.* p. 735. pl. 126 f. 244

*Hab.* Insulae Nicobaricae (*Chemn.*); Insulae Labuana (*Adams*).

(1848) *Chione Japonica*.

C. testa trigona, subcordata, inaequilaterali, antice obtusa, postice angulata, transversim dense striata, fulva, lineis maculisve purpureis, angulosis insignita; vulva oblitterata, lunula ovatocordata, livida, laevigata, superne violaceo maculata; lubiis interioribus vulvae violaceis.

Venus literta, *Chemn. Conch.* vi. 357. pl. 34, f. 364 (non Linn.)

Venus, no 26, *Short. Einl.* iii. 164.

Venus Japonica, *Gmel.* p. 3279, no. 48.

*Dillw. Cat.* i. 182, n. 56.

An eadem spec.? *Wood, Ind. Test.* pl. 7, f. 55.

*Hanley, Descr. Cat.* p. 127; in *Wood, Suppl.* pl. 13, f. 46.

Venus striata (ex darte), *Sow. jun. Thes. Conch.* p. 735. pl. 162, f.

*Hab.* Mare Chinense et Japonicum.

(1849) *Chione Philippii, Desh.*

C. testa ovato-trigona, subcordata, tumida; antice obtusa et latiore, postice angulata, flava, vel griseo-flavo, aliquantisper obscure radiata, transversim striata; striis crassioribus, regularibus, pube lunulaque lividis; lunula ovata, concaviuscula, violaceo superne maculata; marginibus integris; intus pallide aurantia; margine cardinali utraque extremitate macula violaceo notato.

Venus striata (ex parte), *Sow. jun. Thes. Conch.* p. 735. pl. 152.

*Phil. Abbild. Conch.* p. 22. pl. 8, f. 5, 6. (syn. plur exclus.) (non *Chemn.*)

*Hab.* China; Insulae Philippinenses.

(1850) *Chione regularis*.

C. testa ovato-trigona, transversa, turgida, inaequilaterali antice obtusa, postice declivi, subangulata, subrostrata, margine ventrali valde arcuato, flavo-grisea, postice nigro-violascente, transversim regulariter et eleganter sulcata; sulcis convexis, æquidistantibus; lunula elongato-ovata, perplana, laevigata, nitente, superne violaceo maculata; area parva, elongata, lanceolata, plana; valvis intus albis, cardine antice posticeque violaceo maculato, sinu pallii alto, obliquo, brevi, semiovali.

*Chione regularis, Desh. Proc. Zool. Soc.* 1853.

*Hab.* Insulae Philippinenses, (*Coll. Cuming*).



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C. testa ovato-trigona, subcordata, transversim tenue striata, albo cinerascens, longitudinaliter fusco triradiata radiis plus minusve latis, obscurioribus; natibus reflexis; lunula ovata, impressa, striata, marginibus tenuissime crenulatis.

An *Lister*, pl. 306. f. 243?

Venus recens, *Chemn. Conch.* xi. 229. pl. 202: f. 1979.

*Dillw. Cat.* i. 182. no. 55.

*Desh. Lamk. An. s. Vert.* ed. 2. vi. 372. no. 92.

*Hanley, Descr. Cat.* p. 116.

*Wood, Ind. Test.* pl. 7. f. 54.

Tapes recens, *Sow. jun. Thes. Conch.* p. 685. pl. 148. f. 62-66?

Hab. Mare Indicum, ad littus Coromandel (*Chemnitz*).

(1852) *Chione mesodesma*.

C. testa ovata, subtrigona, subaequilaterali, longitrorsum regulariter striata albicante, lutea, flam mulis pallide fuscis maculata, intus violacea.

Venus mesodesma, *Quoy & Gaim. Voy. de l'Astrol.* iii. 532. no. 10. pl. 84. f. 17, 18.

Venus crassa, *Quoy & Gaim. loc. cit.* f. 7. 8.

Venus spissa, *Desh. in Lamk. An. s. Vert.* vi. 373.

*Hanley, Descr. Cat.* p. 117; in *Wood, Suppl.* pl. 16. f. 44.

Venus denticulata, *Quoy & Gaim. loc. cit.*

Venus violacea, *Quoy & Gaim. loc. cit.*

Venus spurca, *Sow. Proc. Zool. Soc.* 1835, p. 23.

*Hanley, Descr. Cat.* p. 119.

*D'Orb. Voy. en Amer. Moll.* p. 559.

*Sow. jun. Thes. Conch.* p. 719. pl. 156, f. 92-93.

Hab. Nova Zelandia; Insulae Philippinenses.

(1853) *Chione Ceylonensis*.

C. testa ovali, oblonga, crassa, laevigata, ventricosa, fulva, pallide viridi faciata, minute fulvo-marmorata, nonnunquam griseo radiata; margine dorsali livido, antice distincte lunulato; latere antico brevi, postico subtruncato; margine ventrali subrotundato.

Tapes Ceylonensis, *Sow. jun. Thes. Conch.* p. 683. pl. 146. f. 24, 25.

Hab. Insula Ceylonensis.

(1854) *Chione pinguis*.

C. testa ovata, transversa, turgida, subcordata, laevigatissima, crassa, fulva, fusco, badio albo maculata, saepius radiata; natibus tumidis; lunula ovata, nitida, griseo-livida; pube depressa, grisea vel caerulecente lineolis numerosis transversis notata.

*Encycl. Meth.* pl. 266. f. 3. & 5.

Venus pinguis, *Chemn. Conch.* vi. 355. pl. 34. f. 355-357.

*Desh. in Lamk. ed. 2. vi. 362.*

*Hanley, Descr. Cat.* p. p. 123.

*Wood. Ind. Test.* pl. 7. f. 51.

*Dillw. Cat.* i. 181. no. 51.

Venus no. 22, *Schrot. Einl.* iii. 163.

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Venus opima, *Gmel.* p. 3279. no. 44.

*Lamk. An. s. Vert.* v. 601. no. 52.

*Desh. Encycl. Meth. Vers.* iii. 1121. no. 23.

Venus triradiata, *Chemn. Conch.* id. '92 & '10 34. f. 356.

*Gmel.* p. 3279. no. 45.

*Dillw. Cat.* i. 181. no. 52.

*Wood, Ind. Test.* pl. 7. f. 52.

Venus no. 23, *Schrot. Einl.* iii. 163.

Venus no. 24, *Schrot. Einl.* iii. 193.

Venus nebulosa, *Chemn. Conch.* vi. 356. pl. 34. f. 359-361. *Gmel.* p. 3279. no. 46.

Venus nebulosa, *Dillw. Cat.* i. 182. no. 53.

*Lamk. An. s. Vert.* v. 602. no. 63, exclus. var.

*Desh. in Lamk. ed. 2. vi. 363. no. 63.*

Pullastra nebulosa, *Sow. in Beech. Voy. Moll.* pl. 43. f. 8.

Tapes pinguis, *Sow. jun. Thes. Conch.* p. 583. pl. 146 f. 20-23.

Hab. Oceanus Indicus; Tranquebar.

(1855) *Chione quadrangularis*.

C. testa quadrato-ovata, subcompressa, crassiuscula, concentrice tenuiter et irregulariter striata, pallide straminea, nitida, umbonibus roseis, latere antico brevi, postico multo longiore, lunula parum distincta.

Venus quadrangularis, *Adams & Reeve Voy. Samar.* p. 79. pl. 24. f. 7.

*Sow. jun. Thes. Conch.* p. 731. pl. 161. f. 196.

Hab. Archipelago Coreensis.

(1856) *Chione undulosa*.

C. testa trigona, nitida, tenuissime transversim striata, albida; lineis rufis transversis undulato-angulatis; margine antico rectilineo, postico convexo,  $1\frac{1}{2}$  longiore; area nulla; lunula oblonga vix circumscripta.

Venus undulosa, *Lamk. Kist. Nat.* v. 606; ed. *Desh.* vi. 370. no. 85.

*Philippi, Abbild. and Beschr.* p. 1. f. 1.

*Hanley, Descr. Cat.* p. 126; in *Wood. Suppl.* pl. 15. f. 49.

*Menke, Moll. Nav. Hall.* p. 45. no. 256.

Venus variabilis, *Sow. Proc. Zool. Soc.* 1835, p. 42.

Venus undulosa, *Sow. jun. Thes. Conch.* p. 738. pl. 158. f. 142-146.

Hab. Nova Hollandia (*Lamarck*.)

(1857) *Chione radiata*.

C. testa ovato-transversa, cordato-subtrigona, turgida, crassa, inaequilaterali, transversim striata, albo-flavicante, rufo vel fusco irregulariter maculata et interruptim radiata, umbonibus magnis, tumidis, oblique inflexis; lunula impressa, cordata; vulvis intus albis, ad umbonum cavitatem praecipue incrassatis; sinue pallii satis lato, profundo, oblique ascendente.

Venus radiata, *Chemn. Conch.* xi. 225. pl. 201. f. 1971-1973.

Venus recens (ex-parte), *Sow. jun. Thes. Conch.* pl. 148. f. 62, 66.

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*Hab.* Mare Rubrum (*Chemn.*); China (*Sow. jun.*).

(1858) *Chione interrupta*.

C. testa oblongo-ovata, transversim striata, demum lævi, albida, maculis magnis fuscis angulatis picta aut radiata, plerumque stella alba ad apices; extremitate utrique rotundata; area lunulaque lævibus, lividis.

Venus interrupta, *Koch, in Phil. Abbild. and Beschr.* p. 30 pl. 8. f. 7.

*Hab.* Oceanus Indicus.

(1859) *Chione marmorata*.

C. testa ovata, crassa, transversim sulcata, alba, fulvo rufoque variegata; ano ovali-oblongo, apice fusco-violascente; pube magna, colorata, lineolata.

*Cytherea marmorata, Lamk. An. s. Vert.* ed. 2. vi. 261. no. 58.

*Deless. Rec. de Coq.* pl. 10. f. 13. a. b.

*Hanley. Descr. Cat.* p. 123. pl. 16. f. 36.

Venus variabilis, *Phil. Abbild. Conch.* p. 12. pl. 3. f. 8. 9.

Tapes laterisulca (pro parte). *Sow. jun. Thes. Conch.* p. 686. pl. 148. f. 68. 69.

*Hab.* Mare Europæum Australe (*Lamk.*); Oceanus Indicus prope Bombay (*Philippi*).

(1860) *Chione ustulata*.

C. testa ovato-transversa, subtrigona, turgida crassa, solida, inaequilaterali, antice obtusa, postice obtusissime angulata, flava, lineis maculisve rufis diversimodo variegata et subradiata; transversim irregulariter sulcata, sulcis triangularibus, in medio obsoletis, ad umbones tenuissimis; lunula ovato-elongata, fusca: area ligamenti brevi, parum profunda, fusciscente; valvis intus pallide flavis; margine cordinali violaceo.

*Chione ustulata, Desh. Proc. Zool. Soc.* 1858.

*Hab.* Portus Mauillæ Philippinarum. Coll. Cuming.

(1861) *Chione ambigua, Desh.*

C. testa ovato-elongata, compressiuscula, lævi. nitidissima, postice multo longiore, subrostrata, antice ascendente, alba, punctis lituris radiisve fuscis picta varie; area lanceolata lunulaque oblonga profundatis, pallide cæruleis, fusco transversim lineatis.

Venus Paupercula, *Philippi Abbild. Conch.* p. 63. pl. 4. f. 5 (non *Chemn.*)

Venus paupercula, var? *Krauss, Sudafr. Moll.* p. 11. pl. 1. f. 10, excl. var.

*Hab.* Canalis Mozambicensis.

(1862) *Chione Kraussi, Desh.*

C. testa brevi, ovato-trigona, tumida, extremitatibus obtusa, margine ventrali convexo; lunula, lata, valde profundata.

Venus paupercula, var., *Krauss, Sudafr. Moll.* p. 11. pl. 1. f. 10. (non *Chemn.*)

*Hab.* Portus Natalensis.

(1863) *Chione Dysera*.

C. testa cordata, crassa, globosa, alba, cingulis membranaceis elatis transversis rarioribus cincta,

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vulva impressa, lævi, ano cordato, margine undique crenulato. cardo congenerum. Striæ nullæ longitudinales. Nates recurvatæ.

Venus dysera, *Chemn. Conch.* vi. 297. pl. 28. f. 291, 292, excl. synonym. (*Linn.*)

*Hab.* Oceanus Indicus.

(1864) *Chione paupercula*.

C. testa subcordata, lævi, punctis et venis subrufis in fundo lutescente undique sparsis notata; vulva retusa, ovali, oblonga, et ano cordiformi impresso violaceis.

Venus paupercula, *Chemn.* ii. 227. pl. 202. f. 1977.

*Dillw. Cat.* i. 172. no. 31.

*Wood, Ind. Test.* pl. 7 f. 31.

*Hanley, Descr. Cat.* p. 127.

An eadem? Venus paupercula, *Phil. Abbild. Conch.* ii. 63. pl. 4 f. 5?

*Hab.* Coromandel (*Chemn.*) Australia; Nova Zelandia. Mus. Brit.

Sub-genera? *Amphichæna. recent.*

*Iphigenia. recent.* 4 sp.

? *Isodonta. recent.*

*Galatea. Syn. Egeria. Potamophila. Megadesma, rec.* 2 or 7 sp.?

Family XVII. Solenidæ.

Genera. Solen. Razor-fish. *Syn. Hypogrea.*

Vagina. Ensis. Ensatella, *rec.* 25 sp. fossil, 10 sp.

Solen linearis.	Indian Seas.
Solen radiatus.	Amboyna.
Solen magnus.	Coast of Necobar.
Solen minimus.	Tranquebar.
Solen virens.	Java.
Solen Diphos.	Indian Ocean.
Solen.	India.
Solen lacteus.	Mus. Brit. Malacca.
Solen.	Malacca.
Solen, undescribed.	Malacca.
Solen.	Malacca.
Solen striatus.	Nicobar Islands.
Solen Amethyotus.	India.
Solen, vagina.	
Solen, cultellus and six others.	

Cultellus. *rec.* 4 sp.

Sub-genera. Ceratisolen. *recent* 1 sp. fossil 1 sp.

Machæra. *recent*, also fossil, 4 sp.

Solecurtus. *Syn. Psammosolen. Macha. Siliquaria, rec.* 25 sp. fossil 30 sp.

Sub genus. Novaculina.

Novaculina Gangeticus, Calcutta.

Novaculina. Malacca.

Novaculina. Tenasserim.

Novaculina. Malacca.

Family XVIII. Myacidæ.

Genera. Mya. Gaper, *rec.* 10 sp. also fossil.

Mya Nicobarica. Nicobar Islands.

Mya crassa. China Fr. w.

Mya corrugata. Coromandel Fr. w.

Mya radiata. Malabar Fr. w.

Mya rugosa. Coromandel.



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- Mya spuria.* Tranquebar Fr. w.  
*Mya truncata* and two others.  
*Corbula. Syn. Erodona. Agina. rec. 50 sp. fossil, 90 sp.*  
*Sub-genera. Potamomya. recent.*  
*Sphenia, recent also fossil.*  
*Næra. Syn. Cuspidaria, rec. 20 sp. fossil, 6 sp.*  
*Thetis. Syn. Poromya. Embla. Inoceramus. Corbula, rec. 5. sp. fossil, 7 sp.*  
*Panopæa. Syn.? Pachymya, rec. 6 sp. fossil, 140 sp.*  
*Saxicava. Syn. Byssomya. Rhomboides. Hiattella. Biapholius, rec. also fossil.*  
*Glycimeris. Syn. Cyrtodaria, rec. also fossil.*  
**Family XIX. Anatinidæ.**  
*Genera. Anatina. Lantern-shell. Syn. Laternula. Auriscalpium. Osteodesma. Cyathodonta, rec. 20 sp. fossil, 50 sp.*  
*Anatina hispidula.*  
*Sub-genera. Periploma. recent.*  
*Cochlodesma. rec. 2 sp. also fossil.*  
*Cercomya. fossil, 12 sp.*  
*Thracia. Syn. Odoncinetus. Corimya. Rupicola, rec. 10. sp. fossil, 30 sp.*  
*Pholadomya. rec. also fossil, 150 sp.*  
*Lyonsia. Syn. Magdala. Myatella. Pandorina, rec. 9 sp. fossil, 100 sp.*  
*Sub-genus.? Eutodesma.*  
*Pandora. rec 13 sp. fossil, 4 sp.*  
*Myadora. rec. 10 sp.*  
*Myochama. rec. 3 sp.*  
*Chamostrea. Syn. Cleidothærus, recent 1 sp.*  
**Family XX. Gastrochænidæ.**  
*Genera. Gastrochæna. rec. 10 sp. fossil, 20 sp.*  
*Sub-genus. Chæna. rec. also fossil.*  
*Clavagella. recent also fossil, 13 sp.*  
*Aspergillum. Watering-pot shell. Syn. Clepsydar rec. 4. sp. fossil, 1 sp.*  
*Aspergillum.*  
*Aspergillum javanum.*  

N. B.—In addition to the Shells above enumerated there are ten or twelve kinds in Singapore for which Dr. Traill cannot find a place among Lamarck's Genus.

*Journ. Ind. Arch. Vol. 1, No. 5, page from 227 to 241, Nov. 1847.*  
**Family XXI. Pholadidæ.**  
*Genera. Pholas. Piddock. rec. 25 sp. fossil, 25 sp.*  
*Pholadidea. rec. 6 sp.*  
*Pholas. Madr.*  
*Pholas orientalis. Indian Ocean.*  
*Pholas costata. East Indies and America.*  
*Pholas striata. India and North America.*  
*Pholas orientalis.*  
*Pholas striatus and two others.*  
*Sub-genera. Martesia, rec. 10 sp. also fossil.*

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- Jonaunetia. rec. 3. sp. also fossil.*  
*Parapholas. rec. 4 sp.*  
*Xylophaga. rec. 2 sp.*  
*Teredo. Syn. Septaria, rec. 14. sp. fossil, 24 sp.*  
*Teredo navalis.*  
*Teredo clava. Coromandel.*  
*Sub-genus. Teredina fossil.*  
**CLASS VI. TUNICATA. TUNICARIES.**  
**Family I. Ascidiadæ.**  
*Genera. Molgula. recent.*  
*Cynthia. recent.*  
*Pelonæa. recent.*  
*Chelyosma. recent.*  
*Boltenia. recent.*  
**Family II. Clavellinidæ.**  
*Genera. Clavellina. recent.*  
*Perophora. recent.*  
**Family III. Botryllidæ.**  
*Genera. Botryllus. recent.*  
*Botrylloides.*  
*Didemnum. recent.*  
*Eucelium. recent.*  
*Distomus. recent.*  
*Diazona. recent.*  
*Aplidium. recent.*  
*Polychinum. recent.*  
*Parascidium. recent.*  
*Armorœcium. recent.*  
*Synœcium. recent.*  
*Sigillina. recent.*  
**Family IV. Pyrosomidæ.**  
*Genus. Pyrosoma. recent.*  
**Family V. Salpidæ.**  
*Genera. Salpa. recent.*  
*Doliolum. recent.*  
*Appendicularia. recent.*  

(1865) MONG-NYEN, BURMESE. (*Sinapis orientalis*).

(1866) MONGOLS. Dr. Latham regards the indigenous Americans, as Mongols who have emigrated direct from Eastern Asia.

(1867) MOONDUN, HIND. A mahomedan rite of shaving the child's head on the 6th or 40th day after birth.—*Herklots*.

(1868) MOONKIR AND NUKIR, according to Mahomedan belief, are two angels who question the dead on their interment, as to their good and bad actions in life.

(1869) MOORSHUD, ARAB. Amongst the Sunni Mahomedans, this person is a religious instructor in a family. Amongst the Shiahs, there are reckoned twelve, viz., Ali and his eleven descendants.

(1870) MOOSUL, is situated on the right bank of the river Tigris; its population and trade has greatly diminished since the time, prior to the discovery of the Cape passage, when it was the thoroughfare for the caravans, between Europe and India. It formerly enjoyed a high reputation for the manufacture which derives its name from the town and is known in France as

## MUSA PARADISIACA.

mousseline and in English as muslin. At a short distance is the mound and village of Nebbi Yunus, in which is a mosque, which covers the supposed tomb of the prophet Jonah.

### (1871) MORINDA CITRIFOLIA.

Noana marum, or Munja | Maddichettoo, TEL.  
pavettay, TAM.

A small tree of common occurrence, the wood and root much used for dyeing red, the wood is deep yellow, easily worked and used for common purposes.—*M. E. J. R.*

### (1872) MORINDA UMBELLATA.

Noona Maram, TAM. | Chota Alka, HIND.  
Patangi Vriksha, CAN. | Molongoodoo Akoo, TEL.

The compact grained wood of this tree is of a beautiful yellowish colour and is frequently made into chairs.—*Rohde, M.S.S.*

(1873) MOTHER O'PEARL shells and tortoise-shell are brought to China from the Archipelago and the Islands of the Pacific, but a large part is re-exported in the shape of buttons, combs, and other productions of Chinese skill.—*Williams.*

### (1874) MUCUNA PRURIENS?

Quah-lay, BURM.

This abounds every where in the jungle. In a tender state the natives use it as food.—*Malcom's Travels in South Eastern Asia*, v. 1. p. 183.

(1875) MUNCHETTY MARAM, the Malayala name of a Malabar tree which grows to about twenty-five feet in height, and eighteen inches in diameter; it is used by the natives for coasting vessels and house building: it is of little value.—*Edge, Mal. Can.*

### (1876) MUNJENATIE WOOD.

Munjenatie marum, TAM.

This wood is used by the natives for making doors, stocks to matchlocks, and for other purposes.—*Ains. Mat. Med.* p. 208.

(1877) MUNJUN. *Hind.* Dentifrice made of charcoal of betel nut, of almond shell, or of frankincense and alum.

(1878) MUREED or disciple. The Mahomedan custom of making mureeds is performed, in the presence of others or alone in a closet by the Moorshud or religious teacher.

### (1879) MURRYA.

Mai-Kai, BURM.

Is not a large tree, but is highly esteemed for handles to spears, knives, &c. The grain is like box wood, but tough and elastic. Found only in the lower Burmese provinces.—*Malcom's Travels in South Eastern Asia*, v. 1. p. 190.

### (1880) MUSA PARADISIACA.

Nep. Yau, BURM.

Is one of the most valuable gifts of providence to a great part of the globe, growing wherever the mean temperature exceeds 65°. The stalk seldom exceeds seven or eight inches in diameter, and twenty feet in height, bears but one bunch of fruit, and dies. The stem is cut close to the ground, but from the same root, however, the

## MUSICAL INSTRUMENTS.

tree is renewed many years. The leaves, when young, are the most beautiful in India, expanding, with a smooth surface, and vivid green, to six feet in length, and two or more in breadth, but, soon after attaining full size, the edges become torn by the wind. The flower is very large, purple, and shaped like an ear of Indian corn. At the root of the outer leaf, a double row of the fruit comes out half round the stalk or cob. The stem then elongates a few inches, and another leaf is deflected, revealing another double row. Thus the stem grows on, leaving a leaf of the flower and a bunch of the fruit every few inches, till there come to be twenty-five or thirty bunches, containing about one hundred and fifty or one hundred and eighty plantains, and weighing from sixty to eighty pounds. The weight bends over the end of the stem, and when ripe it hangs within reach. Like the palms, it has no branches.

Humboldt calculates that thirty-three pounds of wheat, and ninety-nine pounds of potatoes, require the same surface of ground, that will produce four thousand pounds of ripe plantains, which is to potatoes as forty-four to one, and to wheat as one hundred and thirty-three to one. What a mercy is such a tree, in a country where hard labour is oppressive by reason of heat! There are as many varieties of this fruit in Burmah as there are of the apple in England and America; some preferred for cooking, others for eating in a raw state; some sorts grow wild, but in general it is exclusively the result of culture.—*Malcom's Travels in South Eastern Asia*, v. 1. pp. 176, 78.

(1881) MUSA SAPIENTUM. Is common in the southern districts of Burmah, but is not much cultivated. It is found wild, and in that state has seeds, which the cultivated plantains never have.—*Malcom's Travels in South Eastern Asia*, v. 1. p. 178.

(1882) MUSHAEKH, ARAB. A patriarch or devout man, a religious teacher.

(1883) MUSICAL INSTRUMENTS of the Mahomedans of India.

### WIND INSTRUMENTS.

(1884) *Zufereee.*

(1885) *Pultee*, a leaf of the *Cholum* (*Holcus saccharatus*, *Lin.*) held between the lips and sounded.

(1886) *Moorchung*, or jew's harp.

(1887) *Shuhnæe*, a kind of clarionet, a cubit long, and having a leaf mouth-piece, vulgarly called *Soornæe*.

(1888) *Soor*, a bass or drone to the *shuhnæe*.

(1889) *Algon*, a small flageolet, a span long.

(1890) *Nagaysur*.

(1891) *Poonggee*. Of this there are two varieties, one made of leather and sometimes accompanies the *kunchnee-ka-ta*; the other of pumpkin, usually played upon by jugglers and snake dancers, &c.



## MUSICAL INSTRUMENTS.

(1892) *Qurnā*, a straight or curved horn, twelve feet long.

(1893) *Toorree*, or *Toortooree*, commonly denominated by Europeans *colleryhorn*, consist of three pieces fixed into one another, of a semicircular shape.

(1894) *Baukā*, is the preceding one, but the upper piece turned from the performer, forming it into the shape of the letter S.

(1895) *Banslee*, or flute.

(1896) *Sunkh*, or conch shell. It is frequently used by devotees; also as an accompaniment to the *tumkee*. Sometimes they play trios and quartettos on the shells alone.

(1897) *Nursinga*, a sort of horn.

DRUMS, GUITARS, CYMBALS, CASTANETS,  
&c., &c.

(1898) *Chitkee*, or snapping the fingers.

(1899) *Talee*, or clapping the hands.

(1900) *Khunjuree*, a sort of small tambourin, played upon with the fingers.

(1901) *Duff*, or *uffra*, or tambour de basque; "tympanum," according to Gentius, *Sadi Rosar. Polit.* p. 303. A sort of bass tambourin played upon with a stick.

(1902) *Daeera*, the largest variety of tambourin, being from a foot and a half to two feet in diameter, played upon with a stick.

(1903) *Dhol*, a larger drum than the following, both sides covered with leather, and played upon with the hands.

(1904) *D'holuk*, or *Dholkee*, smaller than the preceding, and only one side covered with leather.

(1905) *Meerdung*, the kind of drum which is an accompaniment to the *kunchneea ku taefa*, q. v.

(1906) *Pukhawaj*, a kind of drum, a timbrel.

(1907) *Tubla*, a couple of drums, played upon at the same time, one with each hand.

(1908) *Nurga*.

(1909) *Nugara*, or a kettledrum.

(1910) *Ghurreeal*, a plate of brass for beating time.

(1911) *Tukkoray*, or *Zayrbum*, are small kettle-drums; one is called *Zayr*, the other *bum*.

(1912) *Dunka*, or a bass kettle drum middle size, between the *nugara* and *tukkoray*.

(1913) *Tasa*, or *Tasha Murfa*, a drum of a semicircular shape, played upon with two sticks, and invariably accompanied by the next (*murfa*).

(1914) *Murfa*, a drum like a *d'hol*, covered at both ends with leather, but played upon only on one side with a stick.

(1915) *Tubul*, an enormously large variety of drum, used in the field of battle.

(1916) *Tumkee*, a small circular brass plate, played on by striking it with a piece of wood, having a knob at the end.

(1917) *Dhubboos*, consists of a rod of iron about a foot long, with a knob at one end and a sharp point at the other, having from fifty to a hundred hollow rings which when shook rattle

## MUSK DEER.

against one another: used by *fugeers*, who wield it about, striking their abdomen of a sudden with the sharp point.

(1918) *G'hurra*, or empty earthen vessels, or water pots, played upon with the hand.

(1919) *Si-tara*, or *Yek Tara*, when with one steel wire, called by the latter name: sometimes it has nine or eleven steel wires; but generally three, whence its name, from three, and string.

(1920) *Tumboora*, a sort of *seetar* (guitar), having catgut strings instead of wire.

(1921) *Sarung*, or *Sarungee*, a musical instrument like a fiddle, played upon with a bow.

(1922) *Rubab*, a kind of violin, a rebeck.

(1923) *Been*, or *Vina*, a sort of *seetar* but having two dried hollow pumpkins (*Cucurbita melopepo*, Willd.) fixed to the end of it, with five or seven steel strings; described by Sir William Jones in the *Asiat. Res.*

(1924) *Keenggree*, as the preceding, but having three or four pumpkins, and only two steel strings generally used by Hindoos.

(1925) *Qanoon*, a species of dulcimer, or harp.

(1926) *Urugan*, a kind of organ.

(1927) *Ragmala*.

(1928) *Chukara*, a kind of violin.

(1929) *Thalee*, a flat earthen dish on which they rub and rattle a stick with both hands.

(1930) *Theekree*, two bits of sticks or fragments of earthen vessels used as castanets.

(1931) *Doroo*, a small double headed hand drum.

(1932) *Surod*, a kind of guitar (or *seetar*), having catgut or silk strings.

(1933) *Duppra*.

(1934) *Munjeera*, or *Jhanjh*, a kind of small cymbals in the shape of cups, struck against each other, and accompanying most bands.

(1935) *Tal*, cymbals used by devotees, and frequently an accompaniment to the *taefas*.

(1936) *Ghugree*, one or two hollow rings with pebbles in them, worn on one or both thumbs, and rattled.

(1937) *Goonghroo*, little bells fastened to a string, which is wound round the wrists and ankles, and which jingle at every motion of the limbs.

(1938) *Saz*.

(1939) *Seekhan*, a piece of iron about a cubit long, with which *fugeers* pierce their necks and cheeks.

Also;—An Arab musical instrument, used by the Arabians who frequent the Malabar Coast.

## (1940) MUSK DEER.

The musk-deer, called in Nepal *Kustoora*, is in size about as long as a small gazelle, beautifully formed, very active, and graceful in all its movements, and particularly shy. It inhabits all the most unfrequented parts of the Nepal hills, the male being much smaller than the female.

## MUTHUNKA PILLOO.

bag, which lies near the naval and is about the size of an egg. This musk is found only in the male deer, and, unless cut off before the animal is dead the whole is absorbed in the system, and the pod becomes useless. They are therefore almost invariably taken by nooses.

The natives have many curious traditions regarding this deer, especially as to the manner of the generation of the musk pod. The musk-deer, although one of the most timid and harmless, is at the same time one of the most deadly enemies the viper and adder have in the hills, and its mode of destroying them is curious. The ground on which the musk-deer are generally found, contains likewise large numbers of the small hill adder, a reptile little more than eighteen inches long, but very venomous. It throws itself in the way of man or beast, and invariably bites them. The musk-deer, however, seek for and destroy the adders, wherever they find them, in the following manner. The deer travel generally in pairs; the first that discovers an adder, gives a sharp snort through the nostril, when the other deer immediately comes to its side. The two now commence a series of the most eccentric gambols, jumping and skipping about, over each other's backs, and running round the viper in a circle (I may here mention that the inner hoof of the musk-deer is black and hard, and as sharp as a knife), and after jumping over the adder for five or six minutes, the male strikes it with the fore-foot so rapidly, that the eye cannot follow it, and the adder is thereby immediately destroyed. He then, with two blows, severs the head from the body, after which he displays his triumph and satisfaction by a series of gambols round and over the dead adder and then lies down.

On these occasions the musk-deer is invariably followed by a large buzzard or kite, who, as soon as the deer lies down, flies to and carries off the headless body of the dead adder to the nearest rock and there devours it. The charge of carnivorousness, laid to the poor musk by the ignorant natives, is thus accounted for and removed. The favourite food of the musk deer is a bulbous kind of wild garlic, for the digging up of which nature has provided the male with two small tusks in the upper jaw, about three inches long, and of the thickness of a common quill; with these he digs up the bulb, which smells as powerfully, when fresh, as the strongest musk, and from this food undoubtedly the glutinous and musky matter contained in the bag of the deer is generated.—*Smith's Nepal*.

(1941) MUSTARD OIL. Excellent oil is expressed in various parts of India from the seeds of different species of sinapis, especially from the black mustard seed. *S. glauca*, *S. bichotoma*, and *S. juncea* are extensively cultivated in the East for their oil.

## MYRRH.

cultivated in Chittoor by Miss Pereira. It produces abundantly, and the grain is cooked in the same way as paddy and raggy.—*M. E. J. R.*

(1943) MUZHAB. Arab. See DEEN.

(1944) MYHLENAH in Tamil, Mylelu in Malayala.—This wood is of a greenish tinge, and very close-grained; it grows to about twelve or fifteen feet long, and two and half feet in diameter. It produces a fruit like green pepper; its leaves resemble the mangoe: the wood is generally considered strong and durable, and the native carpenters procure from it the small crooks and branches for the knees and timbers of boats, &c. and the large limbs for the frames of native vessels. The tree is scarce in the north part of Malabar and Canara, and not known in Ceylon.

(1945) MYOUK-GNO, or MOUK-CHAN, *Burm.* Is a large *Burmese* tree of excellent timber. Bark, perfectly smooth; flower, very small on a long stem.—*v. 1. p. 192.*

(1946) MYOUK GO-MYEN, *Burm.* A smaller vine, bearing in its pod but one bean, the size of half a crown. Monkeys are said to be very fond of it, but Burmans do not eat it.—*v. 1. p. 183.*

(1947) MYRICA SAPIDA.

Kai-phul, *HIND.*

The fruit is edible, with a sweetish bitter taste: it ripens in June. In the Himalayas it is generally met with at an altitude of from 4000 to 6000 feet, and its bark is exported to the plains as a dye and as medicine.

(1948) MYROBOLAN EMBLIC.

Nelliekai, TAM.	Aunwera, HIND.
Aoonla, DUK.	Woosherikaia, TEL.
Amluj, ARAB.	Amalaci, SANS.
Amuleh, PERS.	Phyllanthus emblica. LIN.

This is reckoned a fruit and is frequently used as a pickle.

(1949) MYROBOLAN BLACK.

Zengi Har, BENG.	Unripe dried fruit of <i>Terminalia chebula</i> .
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(1950) MYROLE or MIROLE, in Tamil and Malayala, is a Malabar wood of much value, but scarce. It is very heavy and strong, and grows to about twelve inches in diameter, and fifteen or twenty feet high. It is generally used where strength and durability are required.—*Edge. Mal. and Can.*

(1951) MYROSPERMUM. The species are trees with dotted leaves.—*Eng. Cyc. Vol. III, page 1028.*

(1952) MYRRH has long been in repute in low fevers in Europe, and occasionally in agues, Dr. Kirk has found it very useful in the typhoid state which is frequently the second stage of paroxysmal fever in this country, and also in the low adynamic fever of jails. He has also hazarded the conjecture that myrrh is an element of Warburg's Fever Drops, but apparently without any sufficient foundation.—*Ind. Ann. Med. Sci.* for



## N.

(1953) NAGAS, a hill tribe of Assam.

(1954) NAIL-OO, Burmese. This tree attains a diameter of eighteen or twenty inches. Blossom very beautiful and fragrant, yellow, size of a large rose; grows only in wet places. Timber is very worthless.—*V. l. p. 92.*

(1955) NAIDAM PAINI, the Malayala name of a tree which means long Paini. It grows to about two feet in diameter, and seventy feet high, and produces a sort of varnish which is used with the wood-oil before named, for paint or wood. The natives use the spars for rafting timber down the rivers, and for the yards of small vessels. It is a wood of little value, being neither strong nor durable.—*Edye. Mal. Can.*

(1956) NAKHL OOL SHAYTAN, ARAB.  
Devils Date.

This Dwarf-giant of palms grows near Zanzibar. It has no trunk, but the mid rib of each branch is thick as a man's thigh. Eccentric in foliage and frondage, it projects over the waves its gracefully curved arms, sometimes thirty and forty feet long.—*Black. Mag. March 1858, p. 285.*

(1957) NAMI, a root of the form of a large potato, which grows in Mindoro, cultivated also in Timor and in the Moluccas. It is said to be the Manioc or Cassava of South America.

(1958) NANAHI, the Tamil name of a tree, probably the *Morinda citrifolia*, which grows in Travancore and Malabar to about twelve feet in height, and ten inches in diameter. It is generally curved in its growth, and very soft and light. It resembles the American red-birch as to its silvery grain. The native carpenters use it for the frames of small vessels. It is of little value in consequence of its early decay.—*Edye M. and C.*

(1959) NA-NAH. Burm. Is a very large tree, thorny. Fruit deep red, size of a small plum, skin very thin, full of hard, white triangular seeds. Prized only by the Natives.—*V. l. p. 181.*

(1960) NARAH, the Malayala name of a tree that grows to about twelve feet high, and ten inches in diameter. It is curved in growth, and is used for the frames of vessels. It is not very durable, and ranks as one of the inferior sorts of jungle wood.—*Edye. M. and C.*

(1961) NARCISSUS. From the habit of planting the Narcissus upon tombs and shrines, it has acquired a certain sacredness of character. It is true that the Hindus have few tombs. They have shrines however, many of which have been adopted by the Mahammadans. The Narcissus is common in the Punjab.—*Ben. As. Soc. Jo. No. 11, of 1854, p. 146.*

(1962) NARDOSTACHYS JATAMANSI. This species of valerian smells strongly of patchouli, and is a very favourite perfume.—*Hooker Him: Jour: Vol. 1. page 217.* The true spikenard of the ancients is supposed to have been obtained from the *Nardostachys Jatamansi*.—*Simmonds' Comm. Product, 572.*

(1963) NASTURTIIUM TROPÆOLUM.

Natraloo, HIND. | Vally cayang, TAM.

Sweet Potato is the root of a creeper, which is boiled and eaten by common people. It is of two kinds or colours, white and red. The white is supposed to have been brought from some foreign land, and under this supposition it is called Walaitee natraloo or European or Foreign Natraloo, and the other Nat Ka Natraloo or country Natraloo. The white is the better of the two.

(1964) NAUGLEA CORDIFOLIA, RUBIACEÆ. Roxb. C. 53.

Munja cadumbay or | Kolkadum, BENG.  
adumbay, TAM. | Darooga, TEL.

This grows to be a very large tree, it is a native of the mountains of the coast of Coromandel, flowers during the wet season. The seeds ripen about April. The wood of this tree is exceedingly beautiful, its colour is like that of the box tree, but much lighter and at the same time very close grained. It is to be had of a large size from one to two feet or more in diameter and is used for almost every purpose where it can be kept dry. For furniture it answers exceedingly well being light and durable.—*Rox: Rohde M.S.S. Dr. Wight* says that it gives a pretty, close grained, yellow wood, but soft. It is easily worked, attains a rather large size and is much used for common purposes, on trial it sustained a weight of 320 lbs.—*Wight.* And Mr. Rohde remarks on Dr. Wight's note that either the Cumboo or Bundaroo of the Circars is probably the wood here described. These are abundant in the districts of Vizagapatam and Rajahmundry, both are much affected by alternations of dry and wet weather and are only suited for work which is sheltered, for bedsteads, &c. they are sufficiently good, indeed varnished they resemble Rose—the Bundaru has a deeper colour and is, he believes, *Cinchona excelsa* of Roxburgh; the *Hymenodction excelsum*, of Wight and Arnot; but wood cutters and merchants do not distinguish these woods on the Godavery.—*Rohde.*

This resembles a young Sycamore and is very common in Behar.—*Hooker, Him. Jour. Vol. p. 26.*

(1965) NAUCLEA DADUGA. ROXB.

Kadumbay wood, ENG. | Kadumbay marum, TAM.

# NAVY, INDIAN.

of a very beautiful wood for furniture; sometimes, though rarely, brought to the sea ports of the lower provinces of the Peninsula, from Ceylon.—*Ains. Mat. Med.* p. 211.

## (1966) NAUCLEA PARVIFLORA, ROXB.

Bota cadamie is the Telingoo name of a large tree, a native of the Coromandel coast. The wood of it by Dr. Roxburgh's account, is of a light chestnut colour, firm and close grained but soon rots if allowed to get wet.—*Ains. Mat. Med.* p. 212. According to Mr. Rohde, this grows to be a very large tree, is a native of almost every part of the Coast of Coromandel, but chiefly up amongst the mountains. Flowers during the cold season. The wood is of a light chestnut colour, firm and close grained, is used for various purposes, where it can be kept dry, but exposed to wet it soon rots.—*Roxb., Rohde. M. S. S.*

(1967) NAVELLU MARAM, the Tamil name of a tree which signifies "tongue-wood." It grows to about fifteen inches in diameter, and twenty feet high: it is considered a strong and durable wood, and more particularly so under water. The native carpenters prefer it for the frames of small vessels in consequence of its strength and durability.—*Edye. Mal. and Can.*

## (1968) NAVY, INDIAN.

*List of Steam Vessels of the Indian Navy in 1850, showing their Horse Power, Tonnage, complement of men, and number of Guns.*

Names.	Crew.	Horse Power.	Tonnage.	No. of Guns.
Moozuffer (Steam Frigate,) ...	230	500	1480	9
Semiramis, (Steam Frigate,) ...	200	300	960	4
Zenobia, (Steam Frigate,) ...	200	280	1003	6
Auckland, (Steam Frigate,) ...	177	200	946	4
Sesostris, (Steam Frigate,) ...	135	220	873	4
Queen, (Steam Frigate) ...	117	220	873	4
Ajdaha, (Steam Packet,) ...	150	500	1450	4
Perooze, (Steam Frigate,) ...	230	500	1450	7
Achar, (Steam Packet,) ...	132	350	1202	4
Victoria, (Steam Packet,) ...	104	230	705	4
Berenice, (Troop Ship,) ...	104	230	664	2
Medusa, ...	60	70	432	2
Nitocris, ...	52	40	204	2
Assyria, ...	42	40	204	1
Nimrod, ...	42	40	204	2
Comet, ...	42	40	204	2
Meteor, ...	42	24	149	1
Planet, ...	42	60	335	1
Satellite, ...	42	60	335	1
Napier, ...	42	90	445	2
Conqueror, ...	42	50	258	2
Meanee, ...	42	40	208	2
Indus, ...	42	100	522	0
Jhelum, ...	42	60	499	0
Chenaub, ...	42	60	499	0
Mootnee, Flat, ...	53	0	42	1
Euphrates, Iron Flat, ...	20	0	0	0
Sutledge, Accommodation Boat, ...	24	0	0	0
Becas, ...	24	0	0	0
Ravee, ...	24	0	0	0
Snake, ...	6	0	40	0
Kedywarrec, ...	28	0	0	0

# NEPAUL.

*List of Sailing Vessels of the Indian Navy in 1850, showing their Tonnage, complement of men and number of Guns.*

Names.	Crew.	Tonnage	No. of Guns.
Hastings, (Receiving Ship,) ...	75	568	20
Elphinstone, ...	114	387	14
Clive, ...	114	420	14
Euphrates, ...	83	259	10
Tigris, ...	55	259	5
Constance, ...	41	182	3
Mahi, ...	41	157	3
Sheemah, (Pattamar,) ...	24	55	4
Pownah, (Pattamar,) ...	36	43	4
Margaret, Yacht, ...	18	61	4
Palinurus, ...	87	192	4
Nurbudda, (Surveying Tender,) ...	22	49	4
Maldiva, (Surveying Tender,) ...	15	...	...
Cardiva, (Surveying Tender,) ...	12	...	...
	737		89

(1969) NAW OR NAGOO MARAM. Pterocarpus' species, a very strong and durable wood, common on the lower elevations of the Neilgherries: an ordinary sized tree—*McIvor. M. E.*

(1970) NELA, the Tamil name of a tree which is of a dark red colour, and is considered a good wood for boat-work; it produces a small fruit, which the natives eat in a raw state.—*Edye M. and C.*

(1971) NELUMBium SPECIOSUM. THE-KYAH, Burmese. Is a sort of lily, growing in the water; flower very large, pink and white; fruit is as large as a fist, forming an exact hemisphere, on the flat surface of which about twenty-four seeds are imbedded, which, when ripe are black and hard. Prized for eating. The flowers are a favourite offering at the Burmese pagodas.—*Malcom's Travels in South Eastern Asia, V. 1. p. 183.* *Nelumbium Speciosum*, is the Sacred Tawmery Plant. The long fine filaments contained within the cells of the stem are drawn out and thread spun from the filament.

(1972) NEPAUL. The Kingdom, or State of Nepaul, occupies a tract of country about seven hundred and fifty miles in length, and one hundred and seventy in breadth, situated between 26° 31' and 30° N. latitude. It is bounded on the north by a part of Thibet, from which it is separated by the Himalaya chain; on the east, by Bootan and the little Rajahship, or state of Sikkim, from which it is separated by the river Teesta; on the south, by the British-Indian province of Tirhoot, from which it is divided by the Terai, an immense forest, the eastern part of which is called the Moray district; and on the west, by the kingdom of Oude. The divisions of Nepaul are Jumla, Goorkha, Nepaul, Muckwanpore, and Morung. The principal rivers which traverse the territory are the Kalce and Surgoo, which, meeting at a place called Pramadee, form the Goggra and Gunduck. The Gunduck is supposed to rise in the Himalayas, and flows into the



Ganges near Patna. The upper part of the river is called Saligramee, from the fossil ammonites called Saligrams which are found in it, and which the Hindoos hold in veneration.

*Note.* The boundary line to the north is not in our maps properly laid down. It appears by a recent communication from a Nepaul officer, who accompanied the mission to England in the year 1850, that the line should leave the boundary as laid down by us at Gossington, from which place, westward, both slopes of the main chain of the Himalayas belong to Nepaul. The boundary then runs along a ridge to the north of the Himalaya, including Mustang, a place about thirty miles from the foot of Dhawalagiri, and much resorted to by pilgrims. From Mustang the frontier continues west, including the valley of Humla, with the head waters of the river Gogra. From this it appears that the distance from the Nepaul and Thibet frontier, to the Bramaputra or Dsanpo river, is about fourteen miles. The two largest villages to the north, which carry on a great trade in salt with Thibet, are called Thak and Mooktinatt. It should be borne in mind that this boundary is claimed for Nepaul by a Nepaulese, whose assertions there have been no means of disputing. It is not impossible that he may have defined the boundary accurately, but as the extension of their territory has always been a favourite purpose with the Nepaulese, their own definitions must always be received with caution, if not with suspicion.

The geographical position of the British territory, relating to Nepaul is now as follows:

To the extreme west of Nepaul, lies Almorah, a hill-station, wrested from the Nepaulese in the wars of 1815—16; to the extreme east is Darjeeling, another hill-station, used by the Supreme Government of India as a sanatorium for invalids. The principal British cities and military stations which border on the Nepaul territory along the line of the Ganges, are, Berhampore (contiguous to the Morung district), Monghyr, Patna, Dinapore, Ghazeepore, Benares, Allahabad, Cawnpore, Lucknow, Futtighur, and Bareilly; the last named town lying opposite to a Nepaulese fort called Doti, and a few miles from the hill-station of Almorah.

The Terai, or Turry, or Turyanee, is a long strip or belt of low level-land. The word, probably, signifies low or marshy lands, but it is sometimes applied to the flats lying below the hills in the interior of Nepaul, as well as to the level tract bordering immediately on the British frontier. It abounds with large and lofty forest-trees, the chief of which are the Saul and the Bechiacori pine. Some of the Saul spars reach the length of seventy to eighty feet, and are generally considered unequalled for strength and durability. In this respect, however, they must yield to the teak, for there is this peculiarity in

employed in bulk for many years, rising into large fissures longitudinally, and falling a prey to the white ants. Small quantities of gold-dust are found in the Gunduck, which runs through the Terai, and Lignea Cassia is likewise produced in the jungle. The latter, under the name of Sing Rowla, is much used in Hindostan in spicery: the bark of the root does not differ widely from cinnamon, for which it has often been mistaken, but the bark of the trunk and branches possess little of the cinnamon flavour.

Beyond the Terai, and still bearing its name, is a range of hills of about the same width, at the northern base of which commences the valley of Nepaul. This valley, which is nearly oval in shape, is about twelve miles from north to south, and nine miles from east to west. Its circuit has been roughly estimated by the inhabitants at twenty-five coss, or from forty to fifty miles. The range of mountains to the north of the valley is stupendous; the ranges to the east and west are much less lofty, the immediate head of the valley to the westward being defined principally by a low, steep ridge covered with brushwood.

At the foot of the northern range, situated upon the eastern bank of a small river called the Bishenmuttee, in latitude  $27^{\circ} 42' N.$ ; longitude  $85^{\circ} E.$ , stands the city of Khatmandoo, the capital of Nepaul. It is not the largest of the towns in the valley, but enjoys the eminence of a metropolis, because it is the residence of the Rajah, or king, of Nepaul. In length, Khatmandoo may measure about a mile; its breadth is inconsiderable, nowhere exceeding half and seldom extending beyond a quarter of a mile. The name, says Colonel Kirkpatrick, by which the town is distinguished in ancient books, is Gorgoolputten: the Newars call it Yindaise, whilst among the Parbuttias, or mountaineers, it is styled Kulti poor, an appellation which seems to proceed from the same source with Khatmandoo, and derived, it is believed, from its numerous wooden temples, which are among the most striking objects in the city. These edifices are not confined to the body of the town, but are scattered over its environs, particularly along the sides of a quadrangular tank, or reservoir of water. The houses are of brick and tile, with pitched or painted roofs. On the street-side they have frequently enclosed wooden balconies of open carved-work, and of a singular fashion; the front piece, instead of rising perpendicularly, projecting in a sloping direction towards the eaves of the roof. They are of two, three, and four stories, and almost without a single exception are of a mean and poor appearance. The streets are exceedingly narrow, and very filthy.

The city of Patun is of the next importance. It occupies a rising spot of ground, situated about two miles S. by E. of Khatmandoo, and close to the confluence of the Munnohra, Tookcha, and

is that of the Chucro, or wheel of Narain. Patun is called Yellodaise by the Newars; and it is likewise occasionally distinguished from Deo Patun, by the appellations of Lallit-Patun and Lall-Patun. It is a neater town than Khatmandoo.

Bhatgong is perhaps still more superior to Khatmandoo, for though the least considerable of the three towns in point of size, yet its buildings in general have a more striking appearance; and its streets if not much wider, are at all events much cleaner than those of the metropolis, a distinction which it owes to its admirable brick pavement. Bhatgong lies E. by S. of Khatmandoo, at a distance of nearly eight road miles. Its ancient name was Dhurmapatun, and it is called by the Newars, Khopodaire; by whom it is also described to resemble in figure the Dumbroo, or guitar, of Mahadeo. It is the favorite residence of the Brahmins of Nepaul, containing many more families of that order, than Khatmandoo and Patun together.

Kirthipoor occupies the summit of a low hill, about three miles west of Patun. It was at one time the seat of an independent Prince; and its reduction cost the Goorkhali Prince so much trouble, that in resentment of the resistance made by the inhabitants, he barbarously caused all the males, whom he captured in it, to be deprived of their noses. Chobar is also situated on an eminence, which with that of Kirthipoor, forms a kind of saddle hill.

Nepaul contains, from its locality, every variety of climate. The fourth of it lies in the hot plains of the Ganges, and the remaining three parts lie on the slope of the Indian Andes, from the elevation of five thousand feet up to the limit of perpetual snow. It is alleged to contain from forty-three thousand to fifty thousand square miles, and to have two million inhabitants. It may be called the Switzerland of India; but its area is equal to that of three Switzerlands, while the amount of its population is no more than one-third part as great.—*Smith's Five Years at Nepaul*, p. 63, vol. 1.

*Climate and productions of Nepaul.* The height of Nepaul above the level of the sea is about four thousand feet. The thermometer, notwithstanding this height, ranges to 87 degrees. Its usual height about noon varies from 81° to 84°. A little after sunrise, it stands between 50° and 54°, but it is occasionally as low as 47°. At nine in the morning, it fluctuates from 62. to 66°. The mean temperature in March is 67°.

The seasons of Nepaul are pretty nearly the same as those of Upper Hindostan. The rains commence a little earlier, say in the month of May, and set in from the S. E. quarter; they are usually very abundant, and break up towards the middle of October.

Enormous fruit trees are found in the Terai. In addition to the Saul, and the Bechia-conri pine, are to be found the Sissoo, the

Setti-saul, the Phullamical, (an iron wood) the Kalikset, (a sort of black wood), the Sajk, the Burra, the Sunni, and the Moolta. Besides these, there is a small quantity of ebony. These woods constitute in a great measure the commercial wealth of Nepaul. Wood merchants congregate at the southernmost point of the forest near the river Gunduck because of the facility presented by that river of floating the timber to Calcutta.

The inhabitants of Nepaul consist chiefly of Brahmins and Khetries, with their various subdivisions of Newars, Dherwars, Mhargies, Bhootias, and Bhamas. The former of these compose the army, engross all situations of trust, whether civil or military, and are dispersed promiscuously throughout the country. The Newars are confined almost to the valley of Nepaul. The Dherwars and Mhargies are the husbandmen and fishers of the western districts; and the Bhootias, though some families of them are planted in the lower lands, occupy, generally speaking, such parts of the Kachar as are included in the Nepaul territories. The Bhamas are a sort of separatists from the Newars, supposed to amount to five thousand; they shave their heads like the Bhootias, observe many of the religious rites, as well as civil costume of these idolators, in a dialect of whose language they are said to preserve their sacred writings. To the eastward of Nepaul some districts are inhabited by Limboos, Naggunkotes and others.

The Newars are divided into several castes or orders, most of which derive their origin, like those among the more ancient Hindoos, from a primitive classification, according to trades and occupations.

The peasantry of the Parbattiahs, or hill people, are divided into four classes, denominated Awal, Doom, Seoom, and Charem. These are Persian terms, and denote, first, second, third, and fourth. The Awals are those peasants who possess five ploughs and upwards; the Doods, such as have from one to five; the Seooms are those who, without being proprietors of ploughs, are considered to be at the head of a few or more labourers; and the lands of Nepaul Proper are cultivated, almost without exception, by Newars; those to the westward, as Noorkale, &c. by the Parbatty tribe, called Dherwara.

The Ryots or peasantry are distinguished also into Koochrya and Perja. The former are those settled in Bertha proprietary, or other rent-free lands, and are not liable to be called on by government for any services, except the repair of roads, and attendance in the army upon particular occasions. The Perjas, who occupy lands actually belonging to the Prince, though perhaps in the immediate possession of Jagheerdars, are, on the contrary, obliged to perform various services, both at the call of the Jagheerdar and of the Prince.

The great aboriginal stock of the inhabitants of



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the mountains, east of the river Kali, as in Nepaul is Mongol. The fact is inscribed, in characters so plain, upon their faces, forms, and languages, that we may well dispense with the superfluous and vain attempt to trace it historically in the meagre chronicles of barbarians.

The Elthariahs are the descendants, more or less pure, of Rajpoots and other Kshatriyas of the plains, who sought refuge in these mountains from the Moslem, or merely Military service, as adventurers.

The Elthariahs speak the Khas language, and they speak no other.

The martial classes of Nepaul are, then, the Khas, Magar, and Gurung; each comprising a very numerous clan or race, variously ramified and subdivided.

It has been calculated that there are at this time in Nepaul no less than thirty thousand Dakhariahs, or soldiers off the roll by rotation, belonging to the above three tribes. There does not exist any insuperable obstacle to England obtaining, in one form or other, the services of a large body of these men; and such are their energy of character, love of enterprise, and freedom from the shackles of caste, that their services, if once obtained, would soon come to be most highly prized.

In the opinion of competent judges, they are by far the best soldiers in India; and if they were made participators of our own renown in arms, their gallant spirit and unadulterated military habits might be relied on for fidelity; and our good and regular pay, and noble pension establishment would serve to counterpoise the influence of nationality, especially in the Magars and Gurungs.

The beautiful furs, monthly obtainable in Khatmandoo, from Lassa and Digurchee, in Thibet, might be imported. These two large cities are great fur depots; they are only forty marches from Khatmandoo. It is, however, deserving of consideration, whether by encouraging a direct fur trade, we should not be unintentionally giving offence to Russia, for a very large portion of the Russian fur trade is derived from this part of Thibet, and certainly by far the most valuable furs are obtained there. Some of the most beautiful dresses made of furs are brought by the Native merchants from these cities; and he once purchased from one of them a fur cloak with thick silk lining for one hundred and fifty Moree rupees, in English money little more than ten pounds.

*Birds of Nepaul: Catalogue of, by Mr. B. H. Hodgson.*

### (1973) *Vulturidæ*.

Gypætos barbatus,	Vultur tenuiceps.
Neophron perenopterus.	Polypteryx cupido.
Vultur fulvus,	Vultur cinereus.?
Vultur leuconotus.	Hemigyps ponticerianus.
Vultur bengalensis.	

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### (1974) *Falconidæ*.

Buteo canescens.	Falco peregrinoides.
Buteo erythrura.	Falco sultaneus.
Hemietus strophliatus.	Falco micrurus.
Aquila crassipes, v. naevia.	Falco subbuteo.
Aquila nipalensis, v. rubriventer.	Falco rufipes.
Aquila milvodes.	Falco rufipedoides.
Aquila Daphanea.	Falco tinunculus.
Aquila vittata.	Falco tinunculoides.
Aquila bifasciata.	Falco interstinctus.
Neopus perniger.	Falco chicquera.
Butaquila leucophala.	Hierax entolmus v. bengalensis?
Nisætus grandis.	Hyptiopus (baza) lophotes.
Nisætus pallidus.	Pernis bharatensis v. apivorus.
Nisætus nipalensis.	Elanus melanopterus.
Nisætus pulchrior.	Milvus subhemalayanus.
Limnætus unicolor v. pennatus?	Milvus indicus v. cheela?
Circætus nipalensis v. undulatus Vigors.	Milvus? rotundicauda.
Circætus tarayensis.	Astur palumbarius?
Circætus mithilensis.	Astur indicus.
Circætus maculatio.	Butastur teesa.
Circætus gallicus.	Accipiter nisosimilis.
Pandion indicus.	Accipiter scutarius.
Ichthyætus plumbeus v. horsfieldii?	Accipiter subtypicus.
Ichthyætus hucarius.	Accipiter affinis.
Halæetus albipes, v. macei.	Accipiter fringillaroides.
Halæetus lanceatus.	Circus cyaneus.
Dentiger pondicerianus.	Circus cinerascens v. pallidus?
Falco thermophilus.	Circus æruginosus.
Falco milvipes.	Circus melanoleucos.
Falco peregrinus.	Circus nipalensis.
	Circus plumipes.

### (1975) *Strigidæ*.

Athene tarayensis.	Aetoglaux (Huhua) nipalensis.
Athene cuculoides.	Otus vulgaris.
Athene tubiger.	Otus brachiotus.
Athene perlineata, v. undulata? Buch.	Mesomorpha (Urrua) cavaria, v. Bengalensis?
Athene badia.	Mesomorpha Coromandra.
Ninox Jeridius.	Mesomorpha nivicola.
Scops sunia.	Meseides (Bulaca) newarensis.
Scops lettia.	Strix flammea.
Scops pennata, v. Al-drovandi?	Strix badia.
Cultrunguis nigripes.	
Cultrunguis flavipes.	

### (1976) *Caprimulgidæ*.

Caprimulgus saturator.	Caprimulgus nipalensis.
Caprimulgus innotatus.	Caprimulgus gymnopus.

### (1977) *Hirundinidæ*.

Cypselus nipalensis, v. affinis?	Hirundo rupicola.
Choetura gigantea? v. nudipes.	Hirundo rustica.
Hirundo nipalensis.	Hirundo subsoccata.
	Hirundo minuta.

(1978) *Todidae*.

*Eurystomus calorynx*. *Simornis* (Raya) *serice-*  
*Eurystomus orientalis*. *ogula*, v. *Eurylaimus*  
*Coracias bengalensis*. *Dalhousiae*, *James*.  
*Simornis rubropygia*.

(1979) *Trogonidae*.

*Trogon Hodgsoni*.

(1980) *Alcedinidae*.

*Aleyon capensis* ? v *prin-* *Aleyon guttata*.  
*ceps*, H. *Aleyon rudis*.  
*Aleyon smyrnensis*. *Aleyon bengalensis*.  
*Aleyon calipyga*.

(1981) *Meropidae*.

*Merops ferugiceps*. *Merops torquatus*.  
*Merops quincticolor*. *Napohila* (*Bucia*) *nipal-*  
*Merops typicus*. *ensis*.  
*Merops viridis*. *Napohila meropura*.

(1982) *Upupidae*.

*Upupa Epops* ? v. *indi-* *cus*, H.

(1983) *Promeropidae*.

*Cinnyris nipalensis*. *Cinnyris epimecurus*.  
*Cinnyris miles*. *Arachnothera chrysopus*.  
*Cinnyris ignicauda*. *Myzanthus* (*Micrura*) *ig-*  
*Cinnyris epimecurus*. *nipectus*.  
*Cinnyris saturata*. *Myzanthus inornata*.  
*Cinnyris epauletta*. *Pachyglossa melanoxan-*  
*Cinnyris strigula*. *tha*.

(1984) *Meliphagidae*.

*Chloropsis cyanopterus*, *Chloropsis aurifrons*,

(1985) *Certhidae*.

*Certhia himalayana*. *Pnoepyga pusilla*.  
*Tichodroma phænicop-* *Pnoepyga rufiventer*.  
*tera* ? v. *subhema-* *Pnoepyga albiventer*.  
*layana*. *Oligura* (*Tesia*) *cyani-*  
*Sitta castaneoventris*. *venter*.  
*Sitta nipalensis*. *Oligura flaviventer*.  
*Sitta corallina*. *Troglodytes subhema-*  
*Pnoepyga* (*Tesia*) *con-* *layanus*.  
*color*.

(1986) *Luscinidae*.

*Orthotomus sutorius*, v. *Horonis fortipes*  
*ruficapillus*, v. *sphæ-* *Neornis* ? *cacharensis*,  
*nura* ? *Neornis stigiceps*.  
*Decura* (*Suya*) *fuligi-* *Neornis flavolivacea*.  
*nosa*. *Tribura luteoventris*.  
*Decura crinigera*, v. *cau-* *Horeites brunifrons*.  
*data*. *Horeites pollicaris*.  
*Prinia fusca*. *Abromis crochroa*.  
*Cisticola subhemalayana* *Abromis schisticeps*.  
*Salicaria arundinacea* ? *Abromis castaneoceph.*  
*Salicaria affinis*. *Abromis chloropus* v *Re-*  
*Hippolais Swainsoni*. *gulus modestus* *Auct.*  
*Phyllopneuste xantho-* *Abromis xanthogaster*.  
*schistos*. *Abromis tenuiceps* ? v.  
*Phyllopneuste affinis*. *regulus*.  
*Phyllopneuste trochilus*. *Abromis pulchrata*.  
*Phyllopneustereguloides* *Polyodon* \* (*yuhina*) *gul-*  
*Nivicola schistilatus*. *aris*.  
*Horonis flaviventris*. *Polyodon occipitalis*.

*Polyodon nigrimentum*. *Grillivora longicauda*.  
*Myzornis pyrrhoura*. v. *Kittacincta macrura*.  
*Ixulus flavicollis*. *Phaenicura* ? *leucophala*  
*Copsychus saularis*. g. *Chaimarrornis*.

\* Note. *Polyodons* and *Myzornis* here placed in the *Luscinidae*, and *Alcopus* inserted in the *Turdidae*, should have been left as they were placed by Mr. Hodgson, in the family of the *Meliphagidae*. They are genuine Honey suckers in habits and in structure and so also is *Saroglossa* inserted in the sequel under *Sturnidae*.

*Phaenicura rubricauda*. *Tarsiger chrysæus*.  
*Phaenicura rubricauda*. *Larvivora cyanea*.  
*Phaenicura rubricauda* *Larvivora homochroa*.  
*ruticilla*. *Dimorpha* (*Siphia*) *stro-*  
*Phaenicura rubricauda* *phiata*,  
*tricolor*. *Dimorpha rubrocyanea*.  
*Phaenicura rubricauda* *Dimorpha leucocyanea*.  
*cæruleocephala*. *Synornis joulainus*. \*  
*Phaenicura rubricauda* *Synornis leucura*, (*Mus-*  
*schisticeps*. *cicapa auct.*)

*Phaenicura rubricauda*  
*nipalensis*, v. *atrata*.

\* Note. *fæm. mas* of my *Joulamus*, the *leucura* of Gmelin and *rubeculoides* of Sykes who makes the former a *Muscicapa* and the latter a *Saxicola*.

*Nemura cyanura*. *Accentor immaculatus*,  
*Nemura rufilatus*. v. *nipalepsis*.  
*Nemura flavolivacea*. *Accentor cachharensis*.  
*Calliope pectoralis*. *Accentor nipalensis*.  
*Calliope Lathamii*. *Iora scapularis*.  
*Cyanecula* v. *Calliope* *Parus sultaneus*.  
*suecoides*. *Parus xanthogenys*.  
*Muscisylvia leucura*. *Parus monticolus*.  
*Bradypterus phænicu-* *Parus jouschistos*.  
*roides*. *Parus melalophus*.  
*Thamnobia scapularis* *Parus dichrous* ?  
*Rubicola ferrea*. *Parus seriophrys*.  
*Saxicola saturator*. *Parus schistinotus*.  
*Saxicola rubicola*. *Parus æmodius*.  
*Saxicola meloleuca*. *Parus erythrocephalus*.  
*Saxicola insignis*. *Temnoris* \*  
*Accentor strophiatu*.  
*(Suthora) atrifrons*. *Enicurus schistaceus*.  
*Temnoris fulvifrons*. *Enicurus immaculatus*.  
*Zosterops madaraspata-* *Enicurus*. *Scouleri*, v.  
*na*. *heterurus*.  
*Motacilla Hodgsoni*. *Anthus maculatus*.  
*Motacilla boarula*. *Anthus roseaceus*, v. *ru-*  
*Motacilla xanthoschista*. *fogularis* ?  
*Motacilla locustrina*. *Anthus hortulanus*.  
*Budytes calcaratus*. *Anthus brevirostris*.  
*Budytes citreoloides*. *Anthus pelopus*.  
*Budytes schisticeps*. *Cichlops monticolus*, v.  
*Budytes fulvivent*. *Corydalla Richardi* ?  
*Budytes dubius*, v. *an-* *Cichlops ubigbitarius*.  
*thides*. *Cichlops thermophilus*.  
*Enicurus maculatus*. *Cichlops fortipes*.  
*Enicurus fuliginosus*.

\* Note. *Temnoris* next Gould's *Paradoxornis* and Blyth's *Heteromorpha* and *Conostoma* also perhaps.



(1987) *Turdidæ*.

<i>Chlorisoma venaotria.</i>	<i>Hemipteron nipalense.</i>
<i>Myophonus, metallicus.</i>	<i>Crateropus rufimentum.</i>
<i>Myophonus, Temminckii.</i>	<i>Crateropus ocellatus.</i>
<i>Pitta, cyanoptera.</i>	<i>Crateropus moniliger.</i>
<i>Pitta, rodogasster.</i>	<i>Crateropus grisauris.</i>
<i>Haleornis (Paludicola) nipalensis.</i>	<i>Crateropus albogularis.</i>
<i>Cinclus, Pallasii.</i>	<i>Crateropus leucolophus.</i>
<i>Cinclus, P. young ? v. maculatus.</i>	<i>Crateropus cærulatus.</i>
<i>Petrocincla, cyanota.</i>	<i>Crateropus variegatus.</i>
<i>Petrocincla, homochroa.</i>	<i>Crateropus affinis.</i>
<i>Petrocincla, cyanea.</i>	<i>Crateropus erythropterus.</i>
<i>Petrocincla Erythrogaster.</i>	<i>Crateropus erythrocephalus.</i>
<i>Orocetes cinclorhynchus</i>	<i>Trochalopteron melanura, v. zanthoc squamata Gould.</i>
<i>Petrophila turdoides.</i>	
<i>Zoothera monticola.</i>	<i>Trochalopteron setifer.</i>
<i>Turdus pæciloptyx.</i>	<i>Trochalopteron subunicolor</i>
<i>Turdus oreocinclodes.</i>	<i>Timalia pelotis.</i>
<i>Turdus atrogularis.</i>	<i>Timalia leucotis.</i>
<i>Turdus erythrurus.</i>	<i>Timalia pileata.</i>
<i>Turdus ? picaoides.</i>	<i>Pyctoris hypoleuca v. Timalia hyp Auct.</i>
<i>Turdus rubrocanus.</i>	<i>Mixornis ruficeps, v. Timalia gularis, Horst.</i>
<i>Turdus Naumannii.</i>	<i>Strachyris nigriceps.</i>
<i>Turdus viscivorus ?</i>	<i>Strachyris pyrrhops.</i>
<i>Merula nivicolis.</i>	<i>Strachyris chrysæa.</i>
<i>Grandala coelicolor.</i>	<i>Erpornis *zanthochlora</i>
<i>Oreocincla Whitei.</i>	
<i>Oreocincla ? rostrata.</i>	
<i>Oreocincla ? micropus.</i>	
<i>Turdulus, s. g.</i>	

\* Note. *Strachyris*, *Erpornis* and *Mixornis* stood in my arrangement near to *Iora*, *chloropsis*, &c. among the *Brachy pods*, and *Alcopus*, as already noted, among the *Meliphagidæ*, and such I still think are their proper places.

*Bradypterus*, alias *Hemiptilon*.

*Mix*, *ruficeps*, alias *chloris*, alias *gularis*.

*Pyctoris*, alias *Chrysomma*. Type, *Tymalia hypoleuca*, *Auct.*

<i>Malacocercus griseus, v. terræcolor.</i>	<i>Trichophorus xanthogaster.</i>
<i>Malacocercus abornis.</i>	<i>Hemixus flavala.</i>
<i>Malacocercus geochrous.</i>	<i>Hypsipetes psaroides.</i>
<i>Pomatorhinus erythrogenys.</i>	<i>Hypsipetes viridis.</i>
<i>Pomatorhinus schisticeps.</i>	<i>Alcopus (Sibia) picaoides.</i>
<i>Pomatorhinus ruficollis.</i>	<i>Alcopus nigriceps.</i>
<i>Keropia striata.</i>	<i>Alcurus melanocephalus</i>
<i>Oriolus Traillii.</i>	<i>Alcurus nipalensis.</i>
<i>Oriolus galbula.</i>	<i>Ixops nipalensis, v. Actinodura ? Gould.</i>
<i>Oriolus melonoris.</i>	<i>Ixos cafer ? v. pygæus.</i>
<i>Oriolus Hodgsoni.</i>	<i>Ixos leucogenys.</i>
<i>Oriolus juv ? strigipectus.</i>	<i>Ixos jocosus ? v. pyrrhotis.</i>

(1988) *Muscicapidæ*.

<i>Muscicapa æstigma.</i>	<i>Chaitaris (Niltava) rubeculoides.</i>
do. <i>ciliaris.</i>	
do. <i>terræcolor.</i>	<i>Chaitaris sundara.</i>
do. <i>melanops.</i>	<i>Chaitaris sordidus.</i>
do. <i>acormus.</i>	<i>Chaitaris fuligiventer.</i>
do. <i>hemileucura.</i>	<i>Muscipeta paradisea.</i>
do. <i>leucoschista.</i>	<i>Rhipidura albigula.</i>
<i>Digenea leucomelanura.</i>	<i>Myiagra cærulea, v. occipitalis.</i>
<i>Digenea tricolor.</i>	
<i>Hemipus picalcolor, v. muscicapa picata.</i>	<i>Cryptolopha poiocephala.</i>
<i>Hemichelidon ferugineus</i>	<i>Chelidorynx hypoxantha, v. Rhipidura hypoxantha, Blyth ?</i>
<i>Hemichelidon Fuliginosus</i>	
<i>Bainopus irenoides.</i>	

(1989) *Ampelidæ*.

*Leiothrix calipyga v. furcatus.*

\* Note See Monograph of this group in Corby's India Review and in J. A. S.

<i>Certhiparus (Minla) ignitincta.</i>	<i>Pericrocotus sordidus.</i>
<i>Certhiparus castaneiceps.</i>	<i>Graucalus, papuensis ? Nipalensis,</i>
<i>Proparus (Siva) vinipectus.</i>	<i>Volvocivora* melaschistos.</i>
<i>Proparus ? chrysæus.</i>	<i>* Ocypterus volvocivora to next family or laniadæ ocypterus rufiventer.</i>
<i>Fringilliparus (Mesia) argentarius.</i>	
<i>Joropus (Siva) strigula.</i>	<i>Dicrurus fignah ? v. albirictus.</i>
<i>Joropus nipalensis.</i>	
<i>Joropus cyanouropterus.</i>	<i>Dicrurus pyrrhops.</i>
<i>Prosorinia (Cochoa) purpurea.</i>	<i>Dicrurus macrocerus ? v. annectans.</i>
<i>Prosorinia viridis.</i>	
<i>Pteruthius erythronotus.</i>	<i>Dicrurus niniventer.</i>
<i>Peruthitus xanthochlorus.</i>	<i>Dicrurus hemidicrurus.</i>
<i>Heterornis (Cutia) nipalensis.</i>	<i>Preopaterus (Chaptia) æneus, v. muscipetoides.</i>
<i>Pericrocotus, v. phænicornis princeps.</i>	<i>Cometes (Chibia) crishna.</i>
<i>Pericrocotus brevirostris</i>	<i>Cometes grandis.</i>
<i>Pericrocotus perigrinus.</i>	<i>Melisseus (Bhringa) remifer.</i>

(1990) *Laniadæ*.

<i>Tephrodornis pellica.</i>	<i>Collurio obscurior.</i>
<i>Tephrodornis leucura.</i>	<i>Collurio jounotus.</i>
<i>Collurio nipalensis v. tephronotus.</i>	<i>Collurio Hardwickii.</i>
<i>Collurio ferrugiceps.</i>	<i>Collurio tricolor.</i>

(1991) *Corvidæ*.

<i>Garrulus lanceolatus.</i>	<i>Crypsirina vagabunda.</i>
<i>Garrulus bispecularis.</i>	<i>Crypsirina sinensis.</i>
<i>Cyanurus ? erythrorhynchus.</i>	<i>Conostoma æmodium.</i>
	<i>Heteromorpha unicolor.</i>
* Note. <i>Heteromorpha</i> next <i>paradozornis</i> and <i>Temnoris</i> .	
<i>Nucifraga hemispila.</i>	<i>Corvus splendens v. impudicus ?</i>
<i>Corvus macrorhynchus.</i>	<i>Frigilus graculus.</i>
<i>? v. Corone ?</i>	

(1992) *Sturnidæ*.*Saraglossa spilopterus*\*

\* Note. *Saraglossa* to *Meliphagidæ*; a very interesting form placed in genus *Lamprotornis* by Vigors, which has led, I suppose, to its disposal here under the *Sturnidæ*, with which it has no affinity.

*Eulabes* v. *gracula* re- *Pastor tristis*.  
*ligeosa* *Pastor cristatellus*.  
*Pastor roseus*. *Pastor gregicolus*.  
*Pastor Pagodarum* ? v. *Sturnus indicus*.  
*nigriceps*, *Sternopastor contra*.  
*Pastor malabaricus* ? v.  
*caniceps*.

(1993) *Fringillidæ*.

*Ploceus flavigula*. *Emberiza aureola*.  
*Ploceus melanogaster*. *Heterura sylvana*.  
*Ploceus passerinus*. *Alauda leiopus*, v.  
*Ploceus atrigula*. *orientalis*.  
*Coccothraustes melano-* *Alauda triborhyncha*, v.  
*zanthus*. *Leiopus* ?  
*Coccothraustes carripes*. *Alauda dulcivox*.  
*Coccothraustes icter-* *Heterops cristatus*.  
*oides*. *Corypha baghaira*.  
*Spermestes melanoce-* *Plocealauda typica*.  
*phalus*. *Pyrhulauda cruciger*.  
*Spermestes lineoventer*, *Propasser rodopepla*.  
v. *leuconota* ? *Propasser sordida*,  
*Spermestes (Lonchura)* young of *Pulcher-*  
*acuticauda*. *rima* ?  
*Spermestes fuscoluteus*. *Propasser pulcherrima*,  
*Carduelis spinoides*. v. *Pr. rodochroa* ?  
*Procarduelis nipalensis*. *Pyrhulinota rosæcolor*,  
*Pyrghya domesticata*. v. *Pyrh rosea* ?  
*Pyrghya montana*. *Pyrhoplectes epauletta*.  
*Gymnoris flavirostris*. *Propyrhula subhema-*  
*Fringillauda nemoricola*. *chalana*.  
*Emberiza nipalensis*, v. *Propyrhula rubeculoid-*  
*erythroptera* ? *es*.  
*Emberiza sordida*, v. *Propyrhula Sipahi*.  
*chlorocephala*. *Pyrhula erythrocephala*.  
*Emberiza oinopus*, s. g. *Pyrhula nipalensis*.  
*Ocyris*. *Loxia-hemalayana*.

(1994) *Bucerotidæ*.

*Buceros cinerascens*. *Buceros nigrilbus*.  
*Buceros homrai*. *Aceros nipalensis*.

(1995) *Psittacidæ*.

*Palæornis rhodocephalus*. *Palæornis nipalensis*.  
*Palæornis mystaceus*. *Palæornis nigrirostris*.  
*Palæornis ponticerianus* *Psittacula pyropyga vel.*  
*Palæornis schisticeps*. *vetnalis* ?

(1996) *Picidæ*.

*Bucco caniceps* v. *viridis* ? *Piculus rufifrons*.  
*Bucco cæruligula*. *Comeris (Sasia) ochra-*  
*Bucco igniceps*. *cea*.  
*Bucco grandis*. *Picus sultaneus*.  
*Piculus nipalensis*.

*Dryotomus flavigula* v. *Dendrocopos moluccen-*  
*flavinucha* ? *sis*.  
*Chloronerpes* ? *pyrrhotis* *Brachylophus sericollis*  
*Dendrocopus cathpha-* *Brachylophus xanthopy-*  
*rius*. *gæus*.  
*Dendrocopus hypery-* *Brachylophus squama-*  
*thrus*. *tus*.  
*Dendrocopus pyriceps*. *Brachylophus Occipitalis*.  
*Dendrocopus majoroi-* *Brachypternus Shorii*.  
*des*. *Brachypternus igniceps*.  
*Dendrocopus brunni-* *Meiglyptes badius*.  
*frons*

(1997) *Cuculidæ*.

*Phænicophaus montanus* *Cuculus micropterus*.  
*Zanclostomus sirki*. *Cucules saturatus*.  
*Oxylophus coromandus*, *Cuculus sparveroides*.  
v. *rubrarmus*. *Cuculus niger* ? v. *py-*  
*Oxylophus serratoides*. *rommatus*.  
*Eudynamys orientalis*. *Cuculus brevipennis*.  
*Centropus pygmæus*. *Coculus niscolor*.  
*Centropus philippensis*. *Pseudornis dieruroides*.  
*Cuculus hemalayanus* ? *Chalcites xanthorhyn-*  
v. *bharovus*. *chus*.  
*Cuculus canorus*

(1998) *Columbidæ*.

*Vinago spheura*. *Columba pulchrala*.  
*Vinago militaris*. *Columba leuconota*.  
*Ptilonopus turturoides*. *Columba domestica*, var.  
*Ptilonopus macronotus*. *Columba pulchricollis*.  
*Romeris (Toria) aroma-* *Monornis perpulchra*.  
*tica*. *Turtur vitticollis*.  
*Rhinopus (Ducula) in-* *Turtur douraca*.  
*signis*. *Coccyzura tusalia*.  
*Dendrotreron Hodgsoni*. *Æna murmensis*.

(1999) *Phasianidæ*.

*Crossoptilon tibetanum*. *Tragopan satyrus*.  
*Phasianus Wallichii* *Lophophorus Impeya-*  
*Epomia Amherstii*. *nus*, v. *refulgens*.  
*Epomia picta*. *Gallophasis pucrasia*. \*  
*Euplocomus leucomelas*. *Tetraogallus Nigellii*.  
*Gallus Bankiva*.

\* Note. *Gallophasis* was originally applied by me to the *Kaliches*, which are, in structure and in geographic distribution, a most perfect link between tropical *Gallus* and boreal *Phasianus*.

*Ithaginis cruentatus*. *Coturnix philippensis*.  
*Tetraoperdix (Lerwa) ni-* *Coturnix dactylisonans* ?  
*vicola*. v. *indicus*.  
*Francolinus gularis*. *Perdica rubicola*.  
*Francolinus orientalis*. *Hemipodius joudera*.  
*Francolinus vulgaris* ? v. *Hemipodius Dussumi-*  
*brevipes*. *eri*. ? v. *variabilis*.  
*Pyetes (Chacura) chukor*. *Hemipodius taigur* ? v.  
*Arboricola olivacea*, v. *plumbipes*.  
*torquola*. *Pterocles arenarius*.  
*Arboricola rufipes*. *Pterocles pictus*.  
*Coturnix textilis* ? v. *Pterocles exustus*.  
*pluvialis*.



## NEPAUL.

- (2000) *Otidæ*. ●  
*Otis bengalensis*, v. *de-liciosa*. *Otis aurita*.  
*Otis nigricaps*.  
 (2001) *Charadriid*.  
*Ædienemus crepitans*. *Philomachus ventali*,  
*Pseudops grisaeus*. v. *spinosus*.  
*Cursorius taryensis*. *Sarciophorus fuscus*.  
*Glareola nipalensis*, v. *Lobivanellus goensis*.  
*cinerascens*. *Charadrius pluvialis*.  
*Glareola thermophila*, v. *Charadrius rufinus*.  
*longipes*. *Charadrius subrufinus*.  
*Glareola gangetica*. *Hiaticula minor*.  
*Squatarola cinerea*. *Hæmatopus ostralegus*.  
*Vanellus cristatus*.

- (2002) *Ardecida*.  
*Anthropoides virgo*. *Platalea Pyrrhops*.  
*Ardea purpurea*. *Ciconia leucocephala* v.  
*Ardea insignis*. *biclavata*.  
*Ardea cinerea*. *Ciconia nigra*.  
*Egretta chloriceps*, v. *Mycteria australis*.  
*virescens, Auct.* *Osteorophea immigra-*  
*Egretta cinnamomea*. *toria-*  
*Egretta flavicans*, v. *Tantalus rodopteron* v.  
*sata?* *leucocephalus?*  
*Egretta nigrirostris*. *Ibis falcinellus*. (Pseudibis) *papillosa*.  
*Egretta maronata*. *Ibis aimolene*, v. *mela-*  
*Egretta modesta*. *nocephalus*.  
*Nyctiardea europea*.

- (2003) *Scolopacidæ*.  
*Numenius arquata*. *Tringa pusilla?*  
*Numenius arquatula*. v. *Temminckii?*  
*Numenius phæopus*. *Totanus variabilis*.  
*Limosa melanura*. *Totanus minuta*.  
*Clorhynchus strophia-* *Machetes optatus*,  
*tus*. *Machetes Pugnax?*  
*Totanus calidris*. *Rhynchæa capensis?* v.  
*Totanus macularius?* v. *indica*.  
*auratus*. *Gallinago nemoricola*.  
*Totanus glareola*. *Gallinago media?* v.  
*Totanus glottoides*. *uniclavata*.  
*Totanus hypoleucos*. *Gallinago heterura* v. *bi-*  
*Totanus ochropus*. *clivata*.  
*Totanus glareoides*. *Gallinago solitaria*.  
*Totanus fuscus*. *Gallinago gallinula*,  
*Recurvirostra avocetta*. *Scolopar rusticola*.  
*Himantopus melanopte-*  
*rus*.

- (2004) *Palamedidæ*.  
*Parra sinensis*. *Parra indica*.  
*Parra superciliosa*. *Parra Phænicura*.  
 (2005) *Rallidæ*.  
*Zapornia flammiceps*. *Porphyrio hyacinthic-*  
*Zapornia pusilla*. v. *Bail-* *us*.  
*loni*. *Gallinula chloropus*.  
*Zapornia thermophila*. *Fulica atra*.  
*Zapornia nigrolineata*.

- (2006) *Anatidæ*.  
*Anser rubrirostris*. *Myrocygna girra*.  
*Anser indicus*. *Dendrocygna arcuata*.

## NERIUM OLEANDER.

- Tadorna vulpanser*. *Querquedula vulgaris*.  
*Tadorna rutila*. *Fuligula vulgaris*.  
*Tadorna? pnoe*. *Fuligula? cheonea*.  
*Anas mail*. *Fuligula nyroca*.  
*Anas boschas*. *Fuligula Leucophthalmos*.  
*Anas vitticeps*. *Fuligula Caryophyllacea*.  
*Rhynchaspis clypeata*. *Fuligula rufina*.  
*Dafila caudacuta*. *Fuligula cristata*.  
*Mareca pœcilorhyncha*. *Mergus serrator*.  
*Querquedula crecca*.

Cygnus ferus the wild swan whereof, strange to say I procured a sample in the valley of Nepal during a most unusually inclement winter.

### (2007) *Podicipedæ*.

- Podiceps minor*, v. *pan-* *Podiceps cristatus*.  
*dubia*.

### (2008) *Laridæ*.

- Xema ridibunda*. *Sterna roseata*.  
*Xema pallida*.

### (2009) *Pelecanidæ*.

- Pelecanus gangeticus*. *Carbo Javanica*.  
*Pelecanus calirhynchus*. v. *raptensis*.  
*Carbo pygmæus*. *Carbo leucocephala*.  
*Carbo raptensis*. *Plotus melanogaster*.

The list consists of 652 species.

89 Raptorial.

407 Passerine.

44 Gallinaceous.

77 Wading.

35 Palmipedes.—*Beng. As. Soc. Jour.* No. VI. of 1851.

(2010) *NEPHELIUM LONGANUM*. Sapindaceæ. Poovutty marum, Tamil. A moderate sized tree having a strait trunk and fine globular head. The wood is white, hard and close grained, but the carpenters, seem to be unacquainted with it.

(2011) *NEP YAN*, BURMESE; Plantain: *Musa paradisiaca*.

### (2012) *NERIUM ODORUM*.

Kurrubee, HIND.

Common in gardens in every part of India. The bark of the root, and the fragrant leaves are used by the native Indian practitioners as powerful repellants: applied externally. The root is very poisonous.—*O'Sh.* p. 445.

(2013) *NERIUM OLEANDER*. The oleander, rose bay, or spurge laurel.

*Νηριον Ροδοδενρον, Ροδοδαφνη.* Diosc.

Karzahra, HIND.

A native of the warm parts of Europe, of Asia Minor and the lower Himalayas, common in gardens all over India. The whole plant is impregnated with a dangerous principle which has not as yet been insulated, though many attempts have been made to procure it. Its activity and volatility are very great; it is even a popular belief that the vapour of the flowers in a close apartment will prove poisonous. Exter-

nally the leaves and bark have been used (and sometimes even internally) as a remedy in herpes and itch. The rasped wood is employed as rat-bane. The wood itself is used by some eastern nations as the best material for gunpowder charcoal.—*O'Sh.* page 445.

(2014) **NERIUM PISCIDIUM** of Dr. Roxburgh is used for its tough fibres, and contains a narcotic principle which proves pernicious to fish inhabiting tanks in which the fibres are steeped.—*O'Sh.* p. 445. *Nerium Pisidium* is the Echalat of the Cossia Hills, its bark contains fibres, used by the natives as hemp. It is a perennial climber.

(2015) **NETAVIL MARUM** or **CHUNDAO LEPURANDA SACCADORA**. This very common tree is the most gigantic of all in Wynaad jungles. Croramboor bags or sacks are made from the bark: wood not much used.—*McIvor. M. E.*

(2016) **NETTE PALE**, the Tamil name of a tree which produces the country gooseberry: the fruit is one of the most powerful acids of India. It grows to about twelve inches in diameter. The wood is not of any use.—*Edye. Mal. and Can.*

(2017) **NGADJU**, the name of the inhabitants on the Kahayan or Dyak river in Borneo.

(2018) **NICOBAR**. The amount of the whole population spread or scattered over the Nicobar Archipelago does not exceed the moderate number of 8,000 souls; of whom about 2,000 inhabit Carnicobar. Theressa had a population of about 500 souls.—*Jour. Ind. Arch. Vol. III. No 5, 1849.* The Nicobarians are strong and capable of carrying very heavy burdens. Some of them carrying without any trouble 200 cocoanuts.—The language used by the Nicobarians is polysyllabic, abounds in vowels, and its pronunciation is harsh and far from harmonious.—The chief food of the Nicobarians is the pulp of the cocount, yams, plantains, papayahs, fowls, and above all pigs, which abound in those Islands. It is not uncommon to see round a single hut, 40, 50, or 60 of them. The quantity of pigs killed and eaten is almost incredible. The Nicobarians, though voracious, separate the grease from the flesh, and keep it separately for culinary purposes; they never eat, or rather devour any part but the flesh, and that for a single festival day. There was seen and counted 75 large pigs killed for satiating the wolf like appetite of the inhabitants of an inconsiderable district of Theressa Island. In this respect, the Chinese could not be a match for the Nicobarians.—*Jour. Ind. Arch. Vol. III, No. 5. 1849, page 272.*

(2019) **NIGELLA**.

Magreela Kala-jira, HIND.

Seeds of *Nigella sativa*; black, irregularly angular, resembling grains of coarse gunpowder.—*Ben. Phar.*

(2020) **NIKAH**, ARAB. Nikah and Shadee are often in India used synonymously as mean-

ing the marriage or the marriage ceremonial of the mahomedans. The nikah, however, is the form of words used by the Kazee in uniting the couple and the shadee or rejoicings, are all additional, and may be lengthened or curtailed at the will of the relatives. About Delhi, the ceremony of Nikah would appear to be styled "*Burat*." The shadee ceremonial in India is generally used only where the bride is a spinster and of equal rank with the husband.

(2021) **NILA PALA**, the Tamil name of a small tree, the wood of which is very close-grained; it is used in house-work. The root of this tree is used as a medicine, and applied in cases of rheumatism (which are very prevalent after the monsoon sets in); this tree is only found in Travancore and there it is sacred.—*Edye. M. and C.*

(2022) **NIMROUD**. The mound wherein sculptures have been discovered at this ancient place is not far from the Tigris, and about four hours distant from Mosul. Xenophon, in his account of the retreat of the 10,000 makes mention of a pyramid in a town called by him Iarissa. It is most probable that the mound marks the site of that place.

The Birs Nimroud and mound are supposed by Travellers to represent the town of Babel, but others conjecture it to be the remains of a temple of the ancient Borsippa which is mentioned as having been near Babylon, and where Alexander halted on his road to Ecbatana when warned by the Chaldeans not to enter Babylon from the East.

(2023) **NITAM-PALA**, the Tamil name of a tree that grows to about twelve or fifteen feet long and fifteen inches in diameter: it is not of much consideration; it produces a small fruit which is used by the natives medicinally.—*Edye. M. C.*

(2024) **NITO CLOTH**. A cloth used by the wild natives in Mindoro.

(2025) **NOBUTS**.—Are a species of Kettle drum the use of which is confined to royalty, and even then they are used only on occasions of state. In the regulations for the government of Malacca in the 11th Annal it is laid down that when it is necessary for the Lacksamana to be in attendance the Nobuts ought to be present. the term, "to confer Nobuts," means, to give one the government of a country with the rights of royalty.—*Jour. Ind. Arch. No. 8 Vol. 5. Act. 1851.*

(2026) **NOSTOE EDULI** is used in China as food; *Gelidium corneum* enters, it is said by some, into the formation of the edible swallows' nests of the Japanese islands. Agar-agar moss is shipped from Singapore to the extent of 13,000 tons a-year. Irish moss, Iceland moss, Ceylon moss, and some others, are also of some importance. Iodine and kelp are prepared to a considerable extent from sea weeds; one species (*Fucus tenax*) furnishes large supplies of glue to the Canton market. and the orchilla weed is of great importance to the dyer.—*Simmonds*



(2027) NOW-ROZ, PERS. New year's day amongst the Mahomedans the day on which the sun enters the sign Aries.

(2028) NUTMEG. On the progress of the nutmeg cultivation and trade from the early part of the seventeenth century up to the present day.

It is the hitherto extremely limited consumption of nutmegs and mace, and of the latter especially, over the world, as compared with other tropical exportable produce, which has checked and perhaps ever will continue to check, any permanently large progressive increase of these spices.

The aid of arithmetical acumen would scarcely be required to shew that the culminating point of nutmeg cultivation has been nearly, if not already reached, so that should but a merely fractional portion of the area in E. Asia now under the rule of two nations respectively, nay, should the islands of Singapore and Pinang with the lands of P. Wellesley, only,—be fully planted and cultivated with nutmeg trees, the produce of the whole cultivation would be amply sufficient to glut all the markets of the world.

The facts we are about to exhibit have been chiefly obtained from official Dutch records, quoted by British authorities when the Dutch spice islands were under British rule, and from the official reports and statements of these British authorities themselves. The inferences from and observations on these documents are those of the Editor of the Indian Archipelago.

It is well known that the Dutch confined the cultivation of the nutmeg, when they got possession of the Moluccas from the Portuguese, in the end of 1598, to three distant islands.—Lonthoir or great Banda, Banda Neira, and Pulo Aye.

“The first of these presents a ridge of hills of various heights from one extremity to the other, the sides of which are cut into ravines through which descend a few small streams, the only ones on the island. The island is crescent shaped, is 9 miles long and  $2\frac{1}{2}$  miles across where widest. The highest hill or Neira does not exceed 800 feet and the south side is perfectly flat. Gunong Api is a single island or cone of volcanic matter rising from a rocky base and separated from great Banda by a narrow channel. It has the appearance of a heap of cinders and two thirds of it are perfectly black and bare of all vegetation, while a constant smoke rises from the crater.

Pulo Aye, according to Martin, and the S. side of great Banda yield the best nutmegs. Neira is  $2\frac{1}{2}$  miles long and about  $3\frac{1}{4}$  miles across where widest. Pulo Aye is nearly circular and is about  $1\frac{1}{2}$  mile in diameter.—*Present state of Banda* 1813.

Count Nogendorp *Coup d'oil sur le isle de Java &c.* vide Singapore “Free Press” 14th Dec. 1818, informs us in 1830 that Banda Neira lies in

4-30 S. Latitude and 128,18' Long. East of Paris.

“Gunong Api, is so named from the terrible volcano which is found there. Lonthoir is commonly called the *high land*,” other islands are Rosingain, Pulo Aye and Pinang.

“The island of Rosingain has been little inhabited since the extirpation of spices [spice trees] by the Company in 1632.

“The cultivation of the nutmeg is exclusively confined to Banda, Lonthoir and Pulo Aye. Gunong Api is unfortunate on account of its frequent eruptions and its insalubrity. It lies near to Banda and Lonthoir.

“Earthquakes are frequent and ordinarily precede or follow the eruptions. The strongest eruptions were in the following years:—

“1598, 1615, 1632, 1691, 1711, 1749, 1798, 1820. “That of 1691 was a terrible one.” *Coup d'oeil sur le isle de Java &c.*—vide Singapore “Free Press” 14th December 1848.

The intervals betwixt these periods of eruption are therefore consecutively 17, 17, 59, 20, 38, 49, 22, and the general average of these intervals is 31 years and a little more than a month. The most fatal earthquakes took place in 1629, 1683, 1686, 1743 and 1816.” The intervals therefore are 54, 3, 57, 73 years respectively.

Thence it appears that these convulsions arose from there having been no vent for the lava.

The Banda soil is stony. *Defence of the E. India trade, written in 1821, supposed by Thos. Mun.*

By the above average of eruptions and dating back to 1820, an eruption may be expected somewhere about 1857.

Mr. Mun for 1750 rated the total produce of the islands at 250,000 lbs of nutmegs besides mace.

The Dutch author Stavorinus acquaints us that the annual average produce during the early part of the last century was 700,000 lbs (Dutch) of nutmegs, and 180,000 lbs (do) of mace. But he adds, that in the year 1778 a hurricane destroyed all the trees excepting 8,000 which last number yielded an annual produce of 30,000 lbs of nutmegs with the usual proportion of mace. Allowing 10 per cent of trees for males, which is a very small proportion when trees have not from the first been regularly and systematically planted, the productive ones will have thus yielded  $4\frac{1}{8}$  lb. per tree of nutmegs. But if these 8,000 were all bearing or female trees the rate per tree would be  $3\frac{1}{4}$  lbs nutmegs.

Mr. Martin, (*Letter H. B. Martin, Resident at Amboyna, to the Supreme Government dated 24th March 1812.*) estimated the produce previously to the above year (perhaps the year immediately preceding it) at, for Europe 250,000 lbs nutmegs; for India 100,000 lbs, and mace 80,000 lbs, which would admit of a total produce of about 350,000 lbs nuts, the best sorts only being sent to Europe.

Mr. Martin also remarks that this quantity of 700,000 lbs has reference to the beginning of the 18th century. The English market was not then so particular as to quality as it afterwards became so that probably Nos. 1, 2 and 3 were sent to Europe about this period.

If the 3,000 trees yielded 30,000 lbs, then there were 168,000 trees in the early part of the above century. But the rate of bearing here brought forward does not quite tally with subsequent reported averages.

In Dutch official records Pulo Aye afforded the best nutmegs and yielded annually, from 45,000 trees, the quantity of 130,000 lbs or  $3\frac{1}{3}$  lbs (Dutch it is supposed) per tree of nuts.

At this rate therefore the number of trees just before the hurricane would only have been perhaps about 86,000. We cannot however fully rely upon this statement of Stavorinus, for it is supposed that at the period alluded to, the Dutch Government may have kept back part of their produce in order to obtain the highest monopoly price.

The Dutch estimate in this year 1805, (H. R. Martin,) prospectively to 1815, was—the two Bandas 530,000 nutmegs—Pulo Aye 180,000 do. with the usual proportion of mace. But this estimate does not appear to have been realized as will be shown when we come to examine the account by the Resident of Bencoolen, 1806—1812. Mr. Martin shews that the plantation betwixt these two years yielded upon an average 392,000 lbs (English) of nutmegs yearly with  $\frac{1}{4}$  of this quantity of mace.

It would appear that about these periods the exportations to Europe consisted of Nos. 1 and 2 only of nutmegs, or 259,000 lbs. and of mace 80,000 lbs. All the No. 3 and 4 sorts went to India. Mr. Hopkins allows Nos. 1 and 2 to be about  $\frac{4}{5}$ ths of the whole delivery, which seems to me too much according to Straits estimates, where it would be nearer to one half. But even with No. 3 included it would be little more than  $\frac{1}{3}$ rd.

This writer (Major Thom's reports, 1814. History of Java,—and referring probably to 1810,) who must have had ample opportunities of gaining information respecting the Spice Islands, also states that the cultivation of the nutmeg was confined to Lontai or the Great Banda, Neira and Pulo Aye, which last island he makes to be  $1\frac{1}{2}$  mile in diameter. He also allots to its area 45,459 trees, which on a rough calculation would give about 37 trees to an acre, for more could hardly without great crowding have been planted on the area. Indeed, with advertance to irregularities and breaks in the surface, the trees may have been still more closely packed.

He states the average produce in 1810 to have been for all the islands:—

300,000 lbs. of Nutmegs.  
85,000 lbs. of Mace

which would be a decrease of 50,000 lbs. of nutmegs on Stavorinus' average of exportation. He then goes on to observe that the estimated number of trees (males included I suppose) was then 500,000 "from *below* five years of age to upwards of twenty," which information is certainly vague enough and furnishes no precise data on which to found an estimate of the rate of production.

This writer (Mr. Hopkins, 16th March 1812,) acquaints us that the produce had been yearly increasing and cautiously estimates the average amount of produce for ten years prospectively ending in 1822, at betwixt six and seven hundred thousand lbs of nutmegs and for 1824 the quantity of 800,000 lbs.

Crawford's estimate for 1820 was 600,000 lbs of nutmegs and 150,000 lbs of mace, following apparently the Dutch estimate of 1815. But the latter were so far out in their prospective estimate for 1815 as to overrate it by 198,000 lbs of nutmegs.

The following report (The Bencoolen Resident's Reports to the Supreme Government of British India in the years 1814 and 1816,) is the only British official one amongst those already stated, which supplies us with any really precise and tangible data, but it still accords pretty closely in its main point with Major Thom's account. The difference betwixt the number of trees, as given by each is 50,000.

The Resident observes thus:—

	Trees.
There were then of female trees in bearing down to 10 years of age...	339,500
Monocious in bearing down to 10 years of age.....	52,000
	<hr/> 391,505
Males.....	32,000
Unknown from 5 to 10 years of age.....	39,500
Ditto ditto to 5 years old.....	87,500
	<hr/> 159,000

I would, before proceeding further, call the reader's attention to the fact that the female trees above enumerated, are not here reckoned in useful bearing until their tenth year, which accords with Count Hogendorp's account where he says the tree begins to bear about its 9th year and bears fruit for 50 years if sheltered, and that the males are about a 12th part of the whole, the sex of which were known.

The average produce for the three years immediately preceding 1814 was.

461,700 lbs. of nutmegs.  
123,100 lbs of mace.

(Where Dutch accounts are quoted it is the Dutch pound that is alluded to, where English



writers are quoted, unless specified to the contrary, the English lb. seems to be always meant.)

This would only give 1 lb and a little more than  $\frac{1}{2}$  lb for each bearing tree. But we might place the monocious trees nearly out of the account as they bear but a small quantity, or say that we allow ten, perhaps too many, of such for one good female tree.

This will leave 5,200 to be reckoned in the same category with the female trees, thus leaving a total of good bearing trees of 344,700, so that the produce per tree in this instance would be a fraction more than  $\frac{1}{4}$  lb of merchantable nuts and with mace in proportion. ‡

In the journal just quoted the No. of nutmeg trees then planted out was estimated at 570,500, of which 480,000 were in bearing. We are left in ignorance of the source of information. But this estimate would give a smaller produce per tree than that just described.

These results do not accord with the belief generally entertained by those who have had no means of testing the received opinions regarding the fertility of the nutmeg tree in situ, nor with the calculation we have before made on the data of Stavorinus. But, as will be noticed hereafter, there is reason to believe that numbers of the female trees just enumerated were old, although this is certainly but a small portion of the many adventitious and adverse circumstances which should ever be taken into an estimate of spice produce. It would be vain to attempt to reconcile on any other ground the discrepancy betwixt the quantity of produce per tree as determined from the account of Stavorinus, and that shewn by the Bencoolen Resident's statement.

It is believed too, that, while under the British, greater attention was paid to the cultivation of the trees than had before been bestowed on them, it would not be easy to account for the difference betwixt Major Thom's estimate and that of the Resident, of about 16,000 lbs. nutmegs as an increase. But it must be confessed that Stavorinus's account has not given all the details, because while he estimates the produce previous to 1778 at 350 lbs. of nutmegs it appears that in previous years 700,000 had been obtained.

It will however appear in the sequel that the produce has ever been subject to great fluctuations. These were owing to various causes, the most prominent of which were the eruptions of volcanos and earthquakes. We have seen that in 1778 a hurricane nearly annihilated the plantations—and in 1811 a severe storm destroyed much fruit. It has been also shewn from Hogendorp's account that eruptions of the volcano and devastating earthquakes have occurred at no very wide intervals—high winds frequently diminish the crops greatly. The trees were generally planted, perhaps to counteract this evil, too closely; being often only from 16 to 24 feet asunder; tall forest and other trees were

interspersed to arrest the force of the wind, the roots and shade of which must have interfered with the nutmeg trees. The latter are, it appears, only manured with the husks of the nut and fallen leaves. Sulphureous vapours sometimes blast the trees. Some of the hills even are more or less incrustated with sulphur. When old trees or others may have been cut down, their places may not have been always supplied at once by any excepting very young plants. The trees have their lower verticles so much pruned off that a rider on horse-back can easily pass under them. They also diminish in fertility after reaching a certain age, which of course must vary as to the locality and soil, but may be taken from 30 years upwards. But the nutmegs decrease in size and weight as the tree advances in age after a varying period.

Mr. Hopkins in 1812 estimated that, from that year up to 1824, the quantity of produce would be from six hundred to seven hundred thousand pounds of nutmegs from all the trees then planted out. Betwixt 1820 and 1826, an eruption of the volcano of Gunong Api at Banda demolished about three fourths of the trees. Since this catastrophe however there have been no serious inflictions either from wind or fire—so that perhaps the Bandas are now in as palmy a condition as they before were. Gunong Api throws out ashes and streams of sulphureous lava, thus rendering a large portion of the great Banda island useless for nutmeg cultivation. The flat land is not employed for this purpose.

The trees it may be supposed are subject to the same accidents and diseases that attack them in other localities, but I do not find these specified with the exception of the decay produced by white ants—which is always a very serious infliction.

The trees only *begin* to bear about the 8th or 9th year and before they have commenced to lose their shrubby aspect. So that until the tenth year has passed by, they yield but a small return. The nutmeg tree has been cultivated by the Dutch on the Bandas for two centuries and a half, and we can only attribute to its being in its indigenous position, the circumstance, that it has not long ago exhausted the soil, or that, according to the general laws which affect the growth of trees and plants, it has not become unfit at least for this peculiar kind of cultivation. It may nevertheless be assumed that inasmuch as cultivated produce almost always exceeds in quality that which is left to the sole care of nature, so the superior attention paid to the rearing of the nutmeg tree in the straits, where it is in a degree exotic, would seem to ensure a higher rate of productiveness to it than what is to be obtained from the Banda trees. But at the same time we shall have here to assign to this tree a shorter life than that to which it seems to attain in Banda.

## NUTMEG.

There are four chief sources from which the Dutch derive their nutmegs and mace for exportation. From the *Bandas*, *Celebes*, *Palembang* and *Bencoolen* in Sumatra and *Java*—but scantily from the latter island, and perhaps a few other but insignificant localities. But the proportion of the *Moluccas* or *Banda produce* to that of these other places, and which last is termed *free*, is nearly as 100 to 11. The free nuts are deemed a good deal inferior to the monopoly ones. The proportion of Nos. 1 and 2 of these so examined was found to be about one tenth, of any given quantity of mixed nuts.

The merchantable monopoly nuts and mace are sent to Europe and the inferior sorts are crushed and the oil is converted into *nutmeg-soap*, an article which has not yet perhaps been appreciated in England, but might possibly be converted to some useful purpose.

The cultivation of the nutmeg in Java is free, and several years (5 or 9) ago the number of trees then *planted out* was about 40,000. But as there are other safer and more quickly returning kinds of cultivation in that fine island, it does not appear that the nutmeg cultivation there is a favorite one with Europeans.

In 1816, which was eight years before Bencoolen was given up to the Dutch, it was reported officially by Lumsdaine that there were then at that station 26,049 bearing trees. The estimate for 1825 was an addition to these of 15,000 trees, making the total to be 41,049 and for the succeeding years the expected produce was rated at 128,000 lbs of nutmegs, besides mace. The above number of trees would afford us  $3\frac{1}{2}$  lbs of nutmegs for every good bearing tree, which is pretty near to the already noticed average in former years for Pulo Aye.

The total produce of that station at the present day does not it is believed exceed 30,000 lbs and may fall much short of this: 4,160 mace. Little attention seems to be paid to the trees and it was stated by persons who had been there several years ago that a worm had attacked the tree. An export duty of 10 per cent is said to be levied on the spices, which must have its effect in these days of low prices.

In returns obtained from England and other quarters and which correspond as to the quantities of produce with the one given in the January number of the journal, the produce of the eight years from 1828 to 1838 both inclusive, was an average of only 263,520 $\frac{1}{2}$  lbs English per annum of nutmegs, with the due proportion of mace, shewing that the volcanic eruption which happened not long before the first mentioned year, had been the true cause of the deficiency. The table of export of nutmegs from Java as appended in the Journal does not discriminate betwixt the monopoly and free nutmegs.

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The highest produce in nutmegs of any one year from 1825 to 1845 both inclusive, was 8,158 piculs, or lbs English 1,101,303, and the lowest 1,171 piculs or 158,085 lbs English, reckoning 135 English lbs per Dutch picul.

The average of the ten years ending in 1845 was 4636 Dutch piculs or 626,386 $\frac{1}{2}$  lbs English per annum, being 73,614 lbs at least less than the average of the Dutch writer Stavorinus for the middle or earlier part of the 17th century.

But this is not the average of the monopoly nutmegs alone. If we deduct from the above total per annum, the average produce annually of the free nuts from the various stations before named, including Bencoolen being on an average of eight years ending in 1857, 71,820 lbs English, we shall have the monopoly average reduced to 554,566 lbs English per annum.

It is highly improbable that under the present system any increase will take place over this quantity—for independently of it, the trees are we may suppose in their prime, more than 20 years having elapsed since the devastation caused by the last volcanic convulsion already described.

Of late years, as I have been assured, all the nutmegs of a fair merchantable quality have been sent direct to Holland—and the inferior sorts have been converted into nutmeg soap. It is not clearly shewn however where the line lies which cuts off these inferior nuts. It may be presumed that they include what in the Straits would be termed Nos. 5, 6 and 7 and refuse.

The medium sorts chiefly go to China, and to the Eastern Archipelago, as the Straits appear now to supply India.

In 1840-1, however, there were 47,250 lbs of nutmegs imported from Java into Singapore being nearly two-thirds of a year's produce of the nutmegs, on an average of these two years.

But let us admit that the annual average of monopoly nutmegs is 600,000 lbs, and that as the plantations are in their prime the number of bearing trees is the same as it was in the earlier and more flourishing period of the cultivation.

If then the 461,700 lbs nutmegs in 1814 were the produce of the original 691,500 female and monœcious trees but then reduced as before stated to 544,700 good bearing trees, there ought to be now in the *Bandas* in order to produce 554,566 lbs, the number of 363,799 good bearing trees. If we were to apply Dr. Oxley's scale for the Straits, and which allows 10 lbs of spice or say at the very least six lbs of nutmegs to every good bearing tree, the number of good bearing trees at the *Bandas* would, if equally productive, amount only to about or nearly about 100,000, a result which would never be admitted by the Dutch themselves and is quite at variance with all the authentic statistics which have yet appeared.



## NUTMEG.

To exhibit this part of the subject in a clear light let us revert to Pulo Aye. It contained 45,000 trees and yielded

130,000 lbs. nutmegs... .. 45,000

At this rate the two Bandas, which gave 530,000 lbs. of nutmegs, must have had, ... .. 183,46

Total of trees... 228,461

So that even at the highest Dutch rate of productiveness, or 4 lbs. per tree, after deducting 10 per cent for small trees, we should have had from the above total the quantity of 822,460 lbs. of nutmegs, instead of 533,950.

The number of good bearing nutmeg trees in Pinang and Province Wellesley has not been accurately ascertained, owing chiefly to the difficulty of getting correct returns from the Chinese growers. The returns obtained for 1844-5 shewed then upwards of fifty plantations having from 200 bearing female trees up to 12,000 besides 390 nutmeg gardens varying in their contents from 10 up to 200 bearing trees. The total of bearing female trees was upwards of 70,000. But a large increase has taken place since that year.

The actually exported produce for 1847-8 (vide Table) was 2070 piculs of nutmegs or 276,000 lbs. English: besides mace in the usual proportion, so that even admitting that no more female trees had come into bearing, which is very far from being the case, the general average of all the female trees in bearing will have been 500 good merchantable nuts, or a fraction more than  $3\frac{1}{2}$  lbs. per each full bearing tree, or 16th less than 4 lbs.

The table given by Dr. Oxley wants precision, inasmuch as he puts down "produce" without specifying its nature, whether all nutmegs or partly mace. If the mace is to be deducted, we should not have more for 1848 than 25,200 lbs. This he seems to infer since his number of nutmegs would hardly yield so many lbs. of good nutmegs and would probably fall short of it by 46 piculs at least. The bearing trees therefore cannot have yielded more than  $2\frac{1}{4}$  lbs and a trifling fractional part of a lb of sound nutmegs.

We have now therefore the following results:—

*Total Produce by the foregoing details.*

	Nutmegs lbs. English.	Mace lbs. English.	
The Moluccas and Free Trade at the highest.....	600,000	150,000	(a)
Pinang and Province Wellesley 1847-8.....	276,000	88,133	(b)
Singapore 1848.....	25,200	8,400	(c)
Total lbs. ....	901,200	246,533	...
Increase since the first part or middle of the eighteenth century.	651,200	146,500	

(a) This would be one-fourth part of mace.

(b) This would be  $\frac{1}{3}$ d nearly of mace.

(c) This at  $\frac{1}{4}$ th mace.

## NUTMEG.

The return of Pinang exports for 1848—9 cannot be obtained till May and June. An addition of some thousands of lbs would probably then be required to be made to the above quantity.

*Consumption.*—It would be difficult to exhibit correctly the average consumption of nutmegs and mace in the various quarters of the world. There are in fact but very partial data for a computation of it. However this may be, it might be reasonably concluded that all which is produced, is consumed—and that the fall of prices within the past 12 or 15 years has tended to increase consumption to the extent of the amount of increased produce which the extra Hollandic countries to the Eastward have yielded during that period, beyond that of the Dutch monopoly and free cultivation.

The tables appended to this paper and the "Statistics of Nutmegs" will shew where the produce goes from Java and Pinang. Dr. Oxley does not tell us how the Singapore nutmegs are disposed of. It appears that they are chiefly sent to Great Britain.

Little more than one half of the Pinang produce goes to England, or 140,266 lbs. If Crawford's estimate in 1803 of the consumption in Great Britain, or 56,960 lbs. of nutmegs, will apply to the present average rate of consumption there, then a large exportation must take place from that country.

The above author also estimated the consumption of mace in Great Britain at  $11\frac{1}{4}$  parts to 100 of nutmegs.

Unluckily for the planters the taste for these spices does not seem to have been improved by the fall of prices but approaches an inverse ratio. The devastating causes which occasionally reduced the quantity of produce in the Moluccas were unknown to the world, which supposed that consumption was greatly on the increase, because prices were high.

I shall now attempt to estimate the cost of originating and upholding a nutmeg plantation of 3,000 female trees up to the period when its receipts should balance its ordinary expences.

The value of land in Europe depends for the most part on what may be grown, not what actually is growing, upon it, and it has *per se* a real value which may continue with occasional fluctuations for centuries, may for thousands of years or longer. But in these regions, land, with the exception of rice land, has little or no permanent value and depends mainly for that which it has, on the trees or plants growing permanently upon it. Hence, whilst the grain grower would not be ruined by the destruction of a crop, the spice planter may be utterly so by a storm, an earthquake or any one of the catastrophes to which the earth's surface is liable.

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The charges attending the originating and upholding of a nutmeg plantation will vary, but not to any great extent, according to its locality, the nature of the soil and other extraneous circumstances, and like all tropical cultivation, its out-turn will depend a good deal on the price of labour.

The Resident of Bencoolen in a public report to the Supreme Government, dated 1816, describes the several items of expence in originating a plantation of 100 orlongs of land ( $133\frac{1}{2}$  acres) and upholding it till the tenth year. The number of trees in this case would not exceed 6,000 male and female, and ought to be less, if at 30 feet asunder.

Original cost of land, buildings,	Sp. Drs.
implements, labour, cattle, plants....	10,000
Annual charges at 6,395 Drs. for the	
next 8 years....	21,160

This will be up to the tenth year as the plants are set at the 2nd year of their age—and without calculating interest on the outlay. .... Sp. Drs.  
13,160

But he has failed to notice that at the end of these eight years, and we here follow Dr. Lumsdaine who was himself a planter, there would only be 3000 females for every thousand trees originally planted out, viz: that in every 1,000 plants, no more than 750 would reach maturity and only 300 of the latter would be females, which with 50 males to be *retained* would give 350 for the fixed cultivation, that is to say, out of the 6,000 planted out there would only be 1800 female trees. I apprehend however that if the plants were originally kept well apart in a nursery and carefully removed when from two to three feet high, and should the seed nuts have been carefully selected from the upper portions of the trees, there would be a fair probability of one-half turning out female trees.

But this infers the necessity of beginning anew the cultivation of the deficient 3,000 which again at the end of another eight years will demand a recourse to a similar process of renewal, so that the originally contemplated number of bearing trees cannot well be established until the 20th or 25th year at least, after the plantation was begun.

The cost of originating and cultivating a plantation at Pinang will fall short of those just detailed, which is owing to the cheapness of labour there compared with that of Bencoolen, and also to the improved mode of conducting the speculation, for such it must be called.

Dr. Oxley allows 70 trees to an acre, which is a rule quite at variance with the custom which has hitherto obtained in Pinang where 30 feet

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has always been considered the proper distance betwixt trees. So that instead of this large number we should only have 33 trees (■ nearly as possible) for each acre, not reckoning one acre by itself, but a number of acres in a square acre. This figure also of 2s 6d per lb. is opposed to the mercantile value in the English market for the past year at least, and far beyond the local market value, which should be the criterion—as all else is of mercantile speculation.

Dr. Lumsdaine, in his report on the Bencoolen plantations in 1816, says that he values the trees at  $3\frac{1}{2}$  lbs nutmegs each per annum. He allows about 420 lbs of merchantable produce for every 100 of full bearing trees at 15 years old, when he says they are at their highest rate of productiveness, but he adds that some trees yield large crops and others hardly any.

By accounts received from various plantations at Pinang and in Provinc Wellesley the general average results of produce appear to stand thus.

To give a picul by net of merchantable nutmegs in the shell requires nearly 14,819.

This was the average of three estates.

1st Estate .....	14,492
2nd do .....	15,473
3rd do .....	14,492
	44,457

The even quantity of 15,000 nutmegs of all kinds, yields on an average thus:—

	No. of Nuts.	No. of Nuts. per lb.
Of No. 1	1,335	72 to 73
No. 2	4,300	93
No. 3	3,750	111
No. 4	2,094	131
No. 5	1,840	
No. 6 and 7	bad, broken &c. 1,681	

but the weight differs a good deal during the several months of the year. In the dry months the fruit is light and inclined to shrivel.

The mace will be nearly  $37\frac{1}{2}$  lbs.

Or take 100,000 nutmegs in the shell unpicked. Then we shall have:—

No. 1 ... ..	87. 8 catties.
No. 2 ... ..	230.
No. 3 ... ..	167. 14
No. 4 ... ..	80.
*No. 5 ... ..	58. 12
No 6 & 7... ..	50.—674. 2

With mace nearly as above.

The above quantity of 14,819 nutmegs to a picul is produced by  $29\frac{1}{2}$  trees at 500 nuts per tree.



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Crawford averages at 65 oz. avoirdupois of nuts and mace together per tree, which, deducting  $\frac{1}{4}$  for mace, will leave nearly 3 lbs of nutmegs for each bearing tree.

The weight of a given quantity of nutmegs in the shell to the same when freed from it is as 73 to 50 nearly. The mace may be assumed to be about  $3\frac{3}{5}$  (\*) of the whole. (Note. We presume  $\frac{1}{8}$  is meant.—Ed.)

The Dutch used to allow  $12\frac{1}{2}$  per cent loss in curing the nutmegs and mace and the loss afterwards by waste and accident at one third of the whole, which last however appears to be a very high estimate if confined to curing and transporting.

Out of 1,000 nutmegs the produce of any single tree, there will be only about 500 which will be of value.

The plantation has now reached the point when its produce ought to balance its ordinary expences.

Dr. Oxley (Journal Ind. Arch. Vol. 11 p. 657.) observes that good trees yield 10 lbs of SPICE after the 15th year.

This doubtless included mace, and if so the produce in nutmegs would be after a deduction of  $\frac{1}{4}$  for mace,  $8\frac{1}{2}$  lbs per female tree. But the Editor of the Pinang Gazette (25th November 1848.) has controverted this statement.

Dr. Oxley's own Table of Produce shews for his own estate 2,322 bearing trees, and a produce for 1848 of 902,426 nutmegs—thus making only  $388\frac{1}{2}$  per tree. This last number, at the average calculation already stated above, would, throwing the  $\frac{1}{2}$  out, only allow of 3 lbs and a small fractional part of a lb per tree. This estimate of actual produce will therefore admit, for his whole plantation of 2,322 bearing trees, the quantity of  $6,966\frac{1}{2}$  lbs of nutmegs—which are about 290 lbs more than are set down in his column of "produce weight."

But if we take the whole produce of all the plantations noted in his Tabular statement, the result is 14,914 bearing trees with a produce in numbers of 4,085,861 nutmegs—only 273 and nearly  $\frac{3}{4}$  nuts per tree, which make very nearly  $2\frac{7}{8}$  lbs. per tree of nutmegs and  $\frac{1}{4}$  of that quantity of mace.\*

\* Colonel Low appears to have overlooked the column of "Remarks" in Dr. Oxley's paper, in which it is stated that "the greater number of the trees in Singapore, as will be observed from this table, have not come into full bearing, but the produce is increasing rapidly and this year (1848) will amount to fully 500 piculs."—Ed.

There is an abstract of the nature of the produce of three Nutmeg estates in the colony of Pinang, including Province Wellesley.

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15,000 nutmegs which had undergone the process of drying and which rattled in the shell

Sorts or quality.	No. per lb.	No. Nutmegs.	Cat.	T.
† 1st	75	1,335	13	5
2nd	93	4,300	84	8
3rd	148	5,635	47	13
		3,750	25	3
4th	131	9,382	73	
5th	.....	2,094	12	
		1,840	8	13
6th and 7th	being,	1,681	7	8
		15,000	101	5

† Planters do not always adhere to a given size in assorting No. 1, and when the season is adverse or during the least productive months in the year, No. 2 becomes No. 1, or at least the quantity of the true No. 1 is too small to be worth much notice.

The produce for these three estates we have already mentioned. The annual produce therefore of the 2,000 trees alluded to in the estimate, after they have reached a good state of bearing would probably be, at 500 nuts per tree, 8,000 lbs, or 60 piculs. I have before rated the produce per tree at  $3\frac{7}{8}$  lb. but it is by this estimate about 4 lbs. It should however be remembered, as before stated, that the weight of nutmeg fluctuates much during a year—being at its maximum during the rains and at its minimum in the very dry months.

This table allows an average of about 111 or somewhat more, perhaps 112, nuts per lb. of all sorts indiscriminately—say 111 so that 100,000 ungarbled and unselected nuts, after being liberated from the shell, would yield 900 lbs of all kinds of nuts and  $\frac{1}{4}$  more or less of mace at the above estimate, but varying a little throughout the year.

The present local prices rule upon an average 1s. 9d. per lb. for sound nuts. So that the total produce value obtained on the spot would be 4,000 Spanish dollars, reckoning 400 cents of a dollar per 1,000 nuts. The mercantile value is quite uncertain, being a speculative one, but with reference to late prices it cannot be rated much higher than the above price. The future, it must be confessed, is any thing but cheering to planters, for while they cannot reduce expences below a certain point, without great danger to their estates, the prices of nutmegs have every prospect of continuing to fall in the same ratio as they have done for years past. Under this view, as the quantity of nutmegs increases, by the natural progress of the trees to maturity, the ex-

## NUTMEG.

pected increasing profit becomes neutralized by the decadence in its market value.

With advertance to the cost of cultivating nutmegs in the Bandas, Mr. Crawford has stated it at 8 dollars the picul. If it had been found practicable by the Dutch to raise the nutmeg at so low a figure, all competition with them would have been at an end. It is likely that when foreigners first resorted to these islands they obtained only the nutmegs which the woods afforded, as no cultivation had begun until a period long subsequent to their advent.

It may be premised that the Moluccas possess no other produce in such quantity of sufficient consequence to attract trade, and that the nation which holds them must tack on to the cost of raising the tree that of protecting these islands.

Let us again take as our guide, the Dutch author Stavorinus, who informs us that the civil and political charges for upholding the Bandas were in his time £12,000 sterling (calculated from Dutch money) To which was then added the sum of £14,000, paid to the cultivators for nutmegs and mace, making £34,000, by *these two items alone*, so that until the plantations had been renewed eight or nine years after the hurricane, the nutmegs and mace together must have borne a very high prime cost, for the whole expences of these unproductive years must have been charged against them. In like manner such a serious contingent as an earthquake and an eruption or hurricane should be considered in all prospective estimates of produce in these localities.

The Dutch Government in these times supplied slaves and convicts to the cultivators with rice for them at 90 guilders per coyan, although it cost them originally 180 a 200 guilders per coyan.

Martin acquaints us that when he was Resident at Amboyna there were 2,160 slaves in the plantation.

Slaves are, it is believed, paid in some shape or other by the cultivator or cultivators, and the convicts are paid by the latter at 2 copper guilders per month—with 40 lbs. of rice and two suits of clothes yearly. There is no free labour here.

The Government purchases the spices from these contractors at the following rates:—

Cents of a dollar.

Nutmegs 1st quality per lb .....20

Do. 2nd do.....15

Mace.....25

The cost of 900 tons from the Bandas and Amboyna to Java, previous to that of transporting the spices to Europe, requires also to be added.

A force, it is believed, is kept up as in former times to prevent smuggling, which comes however under the head of Government charges in the civil and military departments.

## NUTTALLIA GRANDIFLORA.

The Military force kept up is from 300 to 400 men, one half of them European, the rest natives.

Were the Dutch to abandon these islands, the natives would cultivate the spices themselves. But we might readily predict that in such an event the same care would not be taken of them, for they would not be readily supplied with slaves and protection, and the natives might fall into anarchy when left to rival chiefs. But there seems to be no intention of giving up these islands, at least while they can be made to cover their expences—for this would leave a portion of the Dutch Archipelagic empire open to intruders.

When this sketch was nearly finished the account of Count Hogendorp came opportunely to hand—but unfortunately it comes no higher up than 1822. This abstract of the whole stands as under:—

	Disbursements and charges of Governing,	Receipts.
	Florins.*	Florins.
Amboyna and its Depen- dencies (cloves.) ... ..	970,148 27 15	853 286 25 12
Bandas and do (nutmegs)	571,982 27 12	795,940 06 04
Ternate, ... ..	329,268 04 09	94,447 13 12
Menado and Gorontalo,...	185,517 04 03	315,740 16 08
Total Disbursements. ...	2,056,017 04 07	
Total Receipts. ...		2,059,415 04 04

\* Note. A florin is as nearly as possible 38½ cents of a dollar.

*Statement of Nutmegs and Mace exported from Pinang during the official year 1847—48.*

	Nutmegs.	Mace.
	Piculs.	Piculs.
To United Kingdom,...	1,052	834
„ North America,.....	165	...
„ Arabian and Persian Gulphs	...	1
„ Ceylon,.....	...	1
„ China,.....	...	32
„ France,.....	12	...
„ Pegue,.....	10	1
„ Western Coast of Peninsula,	18	..
„ Coast of Coromandel,.....	52	20
„ Coast of Malabar,.....	72	32
„ Calcutta,...	443	220
„ Arracan,.....	9	2
„ Maulmain,.....	85	3
„ Singapore and Malacca,....	209	15
Total...	2,077	661

—*Jour. Ind. Arch. Vol. 5. No. 8. August 1851.*

(2029) NUTTALLIA GRANDIFLORA.

*Malvace*—A genus of pretty plants, when in blossom, resembling the poppy; they should be



grown in a light rich soil of vegetable mould, the colour of the flowers is pink, purple, red and purple.—*Riddell*.

(2030) NYAPEE. *Burmese*, the Balachang of the Malays. Putrescent fish, in some shape or other is a condiment among all the races from the mountains of Sylhet to the isles of the Archipelago

(2031) NYCTANTHES, SORROWFUL.

Pagaramali, TAM.

Mungapee, TAM.

Kysar, HIND.

Pogada malli, TEL.

The tubes of the corolla of the flower, called in Hindustani *donda*, are employed alone or in conjunction with poorasa flowers in preparing a bright yellow dye much sought after by Maho-

medans for dyeing their turbans—*Ainslie*. The flowers called *dunda poo*. Tel. are used for giving a scent to cloths. Buchanan mentions the product as the powder scattered at the Holi feast *Rhode M. S. S.*

(2032) NYOUNG BAUDEE.—BURM : *Ficus Bengalensis*.

(2033) NYOUN GOO AND PAGAU MYO, BURM : towns three miles apart, are both embraced in the space thickly spotted with the ruined temples of the ancient Burmese capital Pagau. They are the chief seat in Burma Proper, of the manufacture of the boxes and cups made of the varnished basket work, commonly called lackered ware.

## O.

(2034) OOLOGY, *Indian Oology—Notes on the Nidification of some of the commoner birds of the Salt Range, with a few additional from Kashmir, by W. THEOBALDS, Junr., Esq.*

The present paper is the result of observations made during the years 1852-3, chiefly in the neighbourhood of Pind Dādan Khān and Katas, in the Salt Range, with a few scanty, notes made during a flying trip of a month to Kashmir.

The only paper on the same subject was one by Captain Tickell, with which in one or two instances these notes will be found to differ. Layard and Kelaart have also given brief notices on the same subject from which one curious fact may be deduced, viz that the same birds nest varies at times in different parts of the country, a fact by no means surprising when the great extent and varied physical, seasonal and climatic features of our Indian empire are taken into consideration.

At present however, we must content ourselves with the careful exploration of particular districts without attempting to follow out the laws which doubtless regulate these seeming anomalies, which would require much more extensive information than we are at present possessed of.

It is not easy to explain why Oology has not found more favour with those whose taste or opportunities incline them to cultivate some of the minor branches of natural science, for without any undue bias it may at least be reckoned as entertaining and instructive as many of those "ologies" which are usually considered pleasing, and withal, not unfashionable. Many however, who are ready enough conventionally to tolerate other similar pursuits, can, without being able to assign any particular reason, see in Oology little else than trifling and loss of time,

but it requires very little examination to upset such an estimate, for there are few similar studies, if any, that surpass it in interest, few more varied, and none offering a less worked field of enquiry and speculation.

What varied and touching instances of craft and devotion does not the maternal *στοργή* prompt for the concealment and preservation of the callow brood either from natural enemies or from unforeseen perils, and where can we look for more pleasing instances of self denial than among birds engaged in tending their eggs or young. This has ever been a favourite and admired subject with poets and lovers of nature, who will not fail to accept in a far wider sense, than originally attached to them, the lines of Flaccus.

"Non ferox

Hector vorax Deiphobus graves

Excepit ictus pro pudicis

Conjugibus puerisque primus."

At no time too, are more conclusive proofs displayed by the brute creation of intellectual power, than by birds engaged in the duties of incubation. It appears indeed little less than absurd and mere prejudice, to deny this faculty to the inferior animals, for if reason be defined in terms, their actions in a greater or less degree will be found to fulfil those terms with those of man himself, without doubt unmeasurably the highest in every respect of living forms, but between whom and the humbler inhabitants of the earth, that absolute gulph does not exist which his pride—his reasoning pride—has induced him to surmise.

The strong sense of Milton did not fail to see and acknowledge this, for Eve addressing the serpent, says;—

"What may this mean? language of man pronounced?"

By tongue of brute, and *human sense* expressed :  
The first at last of these I thought denied  
To beasts, whom God on their creation day  
Created mute to all articulate sound  
The latter I demur, for in their looks  
Much *reason*, and in their actions, oft appears."

This passage shewing an acquaintance with, and appreciation of, the habits of animals, far from common at the time he wrote, affords a pleasing insight into the character of our great poet.

The means found best, for preserving the fragile objects under consideration, may prove of some service to other collectors.

There are three ways which may be adopted for emptying an egg according to its size and the amount of incubation it has received. All eggs when fresh or only slightly incubated may be blown after a manner, we shall now describe, but some care and careful handling are required to succeed with such eggs as of the English wren or Indian palmswift. The ordinary mode which the young idea usually aspires to inculcate into grandmama is to make a hole at *both* ends, but after deciding on the proper spot which is best in the side, an oval hole must be made varying with the size of the egg, and on holding the hole downwards the contents are easily evacuated by blowing into the egg through a fine pointed blow pipe, the tip of which is just introduced within the shell.

The operation is neat and effectual but a violent blast must not be attempted, as in that case the yolk, may cause a momentary obstruction and the egg explode from the pressure of the confined air within. Neither should the hole be made too large, as the air will then find too ready an exit and fail to expel the last portion of the contents. The empty shell should then be immersed in water and filled, by first exhausting the air with the blow pipe, this will effectually clean the interior, and the last remains of moisture may be absorbed on blotting paper. The interior should then be washed with a solution of corrosive sublimate in spirits. A common six-penny brass blow pipe answers perfectly for this.

When, however, the incubation has lasted a long time, a good plan is to extract the contents by means of a pin bent into a hook. This is a tedious operation which we merely mention in case of any rare egg requiring to be so treated. A third plan answers well for all eggs of a large or medium size, when well incubated. A moderately sized hole must be made in the eggs and the more liquid portion of the contents got rid of. They should then be wiped clean and placed in a shallow pan, when in a few days the maggots of the flesh-fly will consume the contents. They will then only require to be washed; The best mode of packing moderate sized eggs in store is in wooden boxes with saw dust, after closing the holes in the shells with their paper.

Tin boxes are not generally to be trusted, at least when travelling, as with such tender charges committed to their care a little smash goes a great way, as he has ruefully learned from experience. Small eggs travel well packed in some soft nests as those of "*Lanius*" with a little wool and placed in wooden boxes. Small tin boxes fitted into trays in a wooden box are also very handy, but are not readily got well made in India.

For the nomenclature adopted in the present paper the writer was indebted to Mr. Blyth, in several cases from the examination of skins of birds shot off the nest, and with a few exceptions, no reasonable doubt attaches to the correct identification of any bird in the present paper; those to which any uncertainty attaches are indicated by asterisks.

The *Local Name* is ranged under the specific in the second column, the next contains the *Month* and *Week* in which the eggs are laid; the last column the colour of the eggs and a description of the nest.

In the penultimate column, three heads are contained: The number of eggs; usually ascertained from well incubated eggs, to guard against error. The form of the eggs expressed by letters; and the measurement of the long and short axes in inches and decimals of an inch. The following are the commoner forms in the abbreviations used.

O. Oval.	O. P. Ovato Pyriform.
B. O. Blunt oval.	B. O. P. Blunt ditto ditto
P. O. Pointed ditto.	L. O. P. Long ditto ditto.
L. O. Long ditto.	R. O. P. Round ditto.
R. O. Round ditto.	R. Round with some minor combinations.
P. Pyriform.	

(2035) Gyps Bengalensis, Gid Girij. March 1st, 2nd,

$$1. \text{ O. P. } \begin{array}{r} 3.36 \\ \hline 2.62 \end{array}$$

Dull white. Nest of sticks; and twigs; in large trees.

(2036) Neophron percnopterus, Safed doda. March 3d.

$$2. \text{ L. O. } \begin{array}{r} 2.53 \quad 2.75 \\ \hline 1.90 \quad 1.84 \end{array}$$

Pale brownish red, thickly blotched with dark brownish red. Nest, a few twigs placed in holes of cliffs and difficult to approach.

(2037) Haliaetus Gallicus? Burra ludi. March 2nd, 4th, April 2d.

$$1. \text{ B. O. } = \text{ L. B. O. } \begin{array}{r} 2.78 \quad 2.67 \quad 3.18 \\ \hline 2.13 \quad 2.30 \quad 2.30 \end{array}$$

Pure white, with sometimes a few spots of brown. Nest of sticks in large trees.

(2038) Circaetus gallicus, Chota ludi. March 2nd.

$$1. \text{ O. } \begin{array}{r} 2.49 \\ \hline 1.90 \end{array}$$

White with a few minute brown specks. Nest of twigs and sticks in large trees.



## OOLOGY.

(2039) *Polionis teesa*, Trumti. April 2d.

4. O. P.=B. O. P.	1.80	1.93
	<u>1.50</u>	<u>1.50</u>

Pure grayish or plumbeous white. Nest small, of twigs, in trees, near cultivation.

(2040) *Buteo canescens*, Hodgson, Hil. March 1st, 4th.

2-3. O. P.	2.00	2.19
	<u>1.56</u>	<u>1.66</u>

Greenish white, or white, blotched with red or claret brown, vary greatly. Nest large in trees, sticks lined with cotton, rags, &c., and daubed with mud.

(2041) *Lanius lahtora*, Lahtor (generic). March 4th, April 4th.

5. O. P.	1.06
	<u>0.80</u>

Pale greenish white, blotched and ringed with yellowish gray and neutral markings, vary much in intensity and colour. Nest of twigs, lined with cotton or wool and usually placed in stiff thorny bushes.

(2042) *Lanius erythronotus*, May 1st, 4th.

5-6. B. O. P.	0.88	0.93
	<u>0.81</u>	<u>0.68</u>

White or pale greenish white slightly ringed and spotted with yellowish gray and neutral. Nest of roots, coarse grass, rags, cotton, &c. lined with fine grass and placed in forks of trees.

(2043) *Lanius Hardwickii*, May 1st, 4th, June 2nd.

3-4. O. P.=B. O. P.	0.80	0.87	0.73
	<u>0.64</u>	<u>0.65</u>	<u>0.55</u>

Colour same as *L. erythronotus*, also creamy or yellowish white, spotted with darker. Nest compact in forks of thorny trees; outside fibrous stalks, bound with silk or spider web and covered with lichens or cocoons imitating a weathered structure; inside lined with fine grass and vegetable down.

(2044) *Corvus-corax*, Dom kak Doda. January, February.

4. O. P.	1.70
	<u>1.30</u>

Dirty sap green, blotched with blackish brown; also pale green spotted with greenish brown and neutral. Nest of sticks, difficult to get at, placed in well selected trees or holes in cliffs.

(2045) *Corvus splendens*, Kowa. June 4th,

5. O. P.	1.42	1.40	1.56	1.70
	<u>1.05</u>	<u>0.95</u>	<u>1.18</u>	<u>0.97</u>

Clear bluish green, spotted with blackish brown, size and colour variable. Nest, a neat but slight cup of twigs and roots, placed in medium sized trees.

(2046) *Columba intermedia*, Kabuter. March, April, May, June, July.

## OOLOGY.

2. P. O.=B. O.	1.03	1.43
	<u>1.04</u>	<u>1.17</u>

Pure white. Nest none, or only a few twigs in holes, in walls, buildings, cliffs, &c.

(2047) *Turtur risorius*, Panduk. April 3rd, May 1st, September 1st.

2. P. O.=B. O.	1.21
	<u>0.96</u>

Pure white. Nest, a few twigs in low trees and bushes.

(2048) *Turtur Senegalensis*, Ghughu (generic). March, April, May, June, August, Sept.

2. P. O.=B. O.	1.11	1.20
	<u>0.92</u>	<u>0.90</u>

Pure white. Nest, a few twigs in low trees and bushes.

(2049) *Turtur humilis*, April, May, June, August.

2. P. O.=B. O.	0.93	1.02
	<u>0.74</u>	<u>0.76</u>

Pure white. Nest, a few twigs in low bushes or trees.

(2050) *Pavo cristatus*, Mohr manjur. June, July,

O. P.=B. O. P.

Clear brownish cream colour. Nest, a mere hole in the ground in difficult stony places in the hills.

(2051) *Perdix Ponteceriana*, Jita. April 1st, May, Sept.

9. P.=O. P.	1.29
	<u>1.03</u>

Clear cream colour. A little grass in a hole in the ground, usually sheltered by a bush; or in clumps of grass.

(2052) *Ammoperdix Bonhami*, Susi. April, May, June.

12. P.=O. P.	1.40
	<u>1.00</u>

Clear cream colour. A slight hollow among stones in the hills.

(2053) *Caccabis chakor*, Chakor. April, May.

12. O. P.=B. O. P.

Yellowish white or brownish cream colour, faintly ringed and spotted with tan colour. A few leaves on ground under bushes.

(2054) *Turnix Sykesii*? Bailer (Taigoor.) August 3rd.

5. R. P.

Pale gray closely freckled with dirty yellowish ochre, with a few dots of neutral, and blotched with deep reddish brown or blackish amber. Nest, a little grass hemp yarn; and a few hairs on ground in field of Bajra.

(2055) *Palæornis torquatus* Tota (generic.) May 3rd.

4. R. O. P.	1.25
	<u>1.05</u>

# OOLOGY.

# OOLOGY.

Pure white. Nest none, eggs laid in holes, in walls trees and steep banks in company with *columba intermedia*.

(2056) *Palæornis caeruleocephala*. March 3rd.  
4. 5. B. P.  $\frac{1.13}{0.95} \frac{1.17}{0.93}$

Pure white. Eggs laid in holes in trees.

(2057) *Pycnonytus leucotis* Bulbul (generic.)  
May, June, July,  
4. O. P.  $\frac{0.91}{0.64}$

White much dotted with claret red. Nest, a neat cup of vegetable fibres in bushes.

(2058) *Pycnonotus Bengalensis*, May, June, July.  
4. B. O. P.  $\frac{0.87}{0.62}$

Deep pink, blotched with deep claret red. Nest similar to No. 23.

(2059) *Acridotheres tristis*, Maina. June.  
5. O. P.  $\frac{1.20}{0.85}$

Pale bluish green. Nest, roots and other rubbish, in trees or holes in house verandas, &c.

(2060) *Acridotheres gingianus* Gang-maina. May 3rd.  
7. 8. O. P.  $\frac{1.08}{0.81}$

Clear greenish blue. Nest, a hole in the sand at the end of a gallery run into a steep bank, many nests in company.

(2061) *Cypselus affinis*; Ababil (generic)  
April, May, June, August, September.  
O. P.  $\frac{0.90}{0.56}$

Pure white. Nest, light straw and feathers strongly agglutinated to rafters of houses, nests in colonies and often united together, size varies much, some have long necks, others are mere saucers without any. Second nests are less carefully built. The inside is not lined and feels like coarse card board.

(2062) *Hirundo Sinensis*, February 3rd.  
4. O. P.  $\frac{0.62}{0.48}$

Pure white. Nest of grass lined with feathers placed at the end of a gallery in a steep river bank.

(2063) *Oriolus Kundoo*, May 2nd,  
4. O. P.  $\frac{1.17}{0.81} \frac{1.23}{0.75}$

Pure white with a few black spots. Nest a neat cup of woven grass, attached by the side to a bough of some fruit tree.

(2064) *Dicrurus macrocerus*, Japul Kalehit, May, June,  
4. O. P.  $\frac{1.08}{0.73}$

Dirty reddish white spotted with red; colours vary, in some the spots seem to have run, as ink does on damp paper. Nest a neat shallow cup of roots and stalks in bushes.

(2065) *Passer domesticus*, Chureia, February, March, April, May, June, July,  
5-6. O. P.  $\frac{0.85}{0.65} \frac{0.82}{0.61}$

White spotted and blotched with brownish black or brownish white blotched with deep brown, colour varies much. Nest a loose structure of grass and feathers, in trees or houses.

(2066) *Malacocercus Caudatus*, Sor. March, April, May, June, August.  
4-5 O. P. L. O. P.  $\frac{0.84}{0.66} \frac{1.04}{0.60} \frac{0.75}{0.55}$

Clear greenish blue. Nest a loose but deep cup of grass and twigs in bushes in jungle or garden. The first size is common, the second and third measurements were from eggs of one nest.

(2067) *Oxylophus melanoleucus*. (Identified by Mr. Blyth) August.  
1. B. O.  $\frac{0.61}{0.81}$

Deep greenish blue. This evidently parasitical egg was taken from the nest of *Malacocercus caudatus* containing four ordinary eggs which it closely resembles in colour, though its form indicates its parasitical character.

(2068) *Galerida cristata*, Chandul. March 4th, May 3d.  
4. O. P.  $\frac{0.88}{0.66} \frac{0.82}{0.64}$

Yellowish white uniformly freckled, with grayish yellow and neutral, Nest, a little grass in a hole in the ground.

(2069) *Thamnolia Cambaensis*, Jimma (generic) April 2nd.  
4 P. O. P.  $\frac{0.79}{0.60}$

Greenish white ringed and spotted with pale reddish and a little neutral. Nest, loose grass and bits of snake's skin in holes in the sides of nullas.

(2070) *Nectarina asiatica*, May 4th.  
O. P.  $\frac{0.66}{0.47}$

Grayish white, freckled and ringed with cineritious gray. Nest, a neat purse of vegetable fibre and down suspended from some small bough and masked in front by a few dead leaves loosely attached by silk threads.

(2071) *Munia Malabarica*, May, August, September, October, December.  
12.13=(25) O. P.  $\frac{0.59}{0.46} \frac{0.64}{0.44} \frac{0.60}{0.50}$

Pure white. Two pairs of birds frequently if not usually are employed in the construction



of one nest in which the two hens consecutively lay—so the same nest has sometimes 25 eggs in it in different stages of incubation—nest often clumsy and hastily made—but usually a neat domed structure of fine grass with one opening, sometimes prolonged into a short deflected neck partially closed by the elasticity of the long spikes of grass forming it; sometimes the nest is a simple platform of grass, open at each end, but the grass ends curved over to meet at the top, usually placed in thorny bushes, often very conspicuously and close to roads. It is much to be doubted if the eggs found occasionally in October and December are hatched.

(2072) *Podiceps Philippensis*, Pandubi. August, September,

5. P. O. L. P. O.  $\frac{1.50}{1.04}$   $\frac{1.42}{1.00}$

Pure white; when recently laid, green: is soon soiled brown in the nest. Nest, a few weeds heaped on the rank vegetation of jheels, but floating and usually several nests together.

(2073) *Gallinula chloropus*, August 4th,  
O. P.  $\frac{1.62}{1.15}$

Pinkish cream or gray spotted and slightly ringed with deep red brown.

(2074) *Sarciophorus bilobus*. Jithiri. May 2nd.

3. P.=O. P.  $\frac{1.63}{1.19}$

Nest as *Podiceps philippensis* eggs also stained by nest; creamy yellow or stone colour, thickly spotted and blotched with blackish brown.

(2075) *Ardeola leucoptera*. Bogla (generic.) June 4th.

5. 6. P. O.  $\frac{1.54}{1.16}$

Pale green. Nest of loose sticks in trees.

*Kashmir Notes.*

(2076) *Tinunculus alandanus*. Shikra. April 3rd.

6. B. O. P.  $\frac{1.68}{1.22}$   $\frac{1.51}{1.27}$

Pale reddish brown, freckled and blotched with brownish red. Nest, hole in sarai wall of Thanna S. of Baranegala Shahabad and valley generally.

(2077) *Milvus*? *Buteo*, April 4th.

2 O. P.  $\frac{2.10}{1.80}$   $\frac{2.40}{1.77}$

Nest and eggs as in plains (*Buteo canescens* ante).

(2078) *Corvus*, Small black hill Crow. April 3rd.

4. O. P.  $\frac{1.70}{1.20}$   $\frac{1.60}{1.25}$

Green spotted with brown, valley generally. Nest placed in "Chinar" and difficult trees.

(2079) *Corvus monedula*, May 1st.

4. 5. 6. O. P. L. O. P.  $\frac{1.26}{0.99}$   $\frac{1.45}{1.00}$   $\frac{1.60}{1.00}$

Pale clear bluish green; dotted and spotted with brownish black. Valley generally; in holes of rocks, beneath roofs, and in tall trees.

(2080) *Sturnus vulgaris*, Jilgiri. May 2nd, 3rd.

O. P.  $\frac{1.15}{0.85}$

Pale clear bluish green. Valley generally; in holes of bridges, tall trees, &c. in company with *Corvus monedula*.

(2081) *Acridotheres tristis*, April 3rd.

Nest and eggs as in plains Rajaori and lower hills generally.

(2082) *Cacabis chukor*. May 3rd.

Nasmana on the Chandra-baga: eggs as ante.

(2083) *Pycnonotus leucotis*, April 4th at Bhimba. May 2nd at Islamabad.

Nest and eggs as in plains ante No. 23.

(2084) *Hirundo rustica*, \* May 2d  
4. L. O. P.  $\frac{0.83}{0.53}$

Pure white, spotted with bright reddish brown; valley generally. Nest under eaves, outside course straw cemented with mud, inside fine straw lined with feathers.

(2085) *Budytes citreola*, May 3d.

4. O. P.  $\frac{0.95}{0.70}$

Pale gray thickly dotted and ringed with grayish brown and grayish neutral mingled together. A depression in soft earth beneath a rock near B'aragari, valley generally.

(2086) *Anas Boschas*, May 1st.

L. O. P.  $\frac{2.27}{1.55}$

Dirty white with a tinge of yellowish green near Supeia, valley of Cashmir.

(2087) *Podiceps cristatus*? May 2d.

5. O. P.  $\frac{2.53}{1.51}$

Pure white; when recently laid pale green. Wala lake Nest, a heap of weeds floating on the surface of the water, but connected to reeds, &c.

(2088) *Podiceps Philippensis*, May 2d.

5. P. O.  $\frac{1.40}{1.00}$

Pure white. Wala lake. Nest as *Podiceps Cristatus*.

(2089) *Fulica atra*, May 2d.

8. L. O. P.  $\frac{2.10}{1.40}$

Pale brownish gray, dotted with reddish black. Wala lake. Nest, pieces of dried reeds

about 6 inches long, piled together among reed and floating on the water.

(2090) *Gallinula chloropus* May 2d.

O. P.  $\frac{1.70}{1.26}$   $\frac{1.57}{1.11}$

Pale gray or reddish gray dotted and spotted with deep reddish brown. Nest, a few weeds heaped on the water among reeds.

(2091) *Eudynamys orientalis*; Monghyr, June 3d.

1. O. P.  $\frac{1.20}{0.90}$

Pale dirty green, much blotched with reddish brown. Had but one egg brought, and the man reported four crow's eggs in the same nest.

(2092) *Centropus rufipennis*, Monghyr, June, August.

4. O.  $\frac{1.30}{1.09}$   $\frac{1.47}{1.21}$

Pure white: nest placed in dense trees, a neat but loose structure of twigs domed, and with aperture in the side lined with dried leaves.

(2093) *Cypselus affinis*, Monghyr, May, June.

4. O. P.  $\frac{0.90}{0.66}$

Pure white; nest described in a former paper. Mr. Layard, however, describes it as building a *mud* nest in Ceylon (vide annals for 1853, page 311).

(2094) *Milvus ater*, Calcutta, October 4th.

3. O. P.  $\frac{2.21}{1.68}$

Greenish-white, spotted and blotched with pale reddish brown: nest of sticks, bulky, placed in tall trees.

(2095) *Gyps bengalensis*, near Deoghur, November 4th.

1. O. P.  $\frac{3.20}{2.52}$

Pure white. Nest of sticks, usually small for the size of the bird, and placed at the top of cotton trees or others, very difficult to ascend.

(2096) *Buceros cavatus*. Tenasserim, February 3d.

1. O. P.  $\frac{2.68}{1.88}$

Pure white. For the measurement of an egg, indebted to Capt. Tickell, who was fortunate enough to observe the female on the nest.

In holes of trees, in which the female is built in with mud by the male, as observed by Capt. Tickell (p. 279, *ante*).

(2097) *Buceros subruficollis*, Tenasserim, February 3rd.

3. O. P.  $\frac{2.20}{1.55}$

Pure white. Mode of incubation said to be similar to the last.

(2098) *Halcyon smyrnensis*, Mergui, March 4th.

5. B. O.  $\frac{1.20}{1.03}$

Pure white. Gallery  $1\frac{1}{2}$  feet in a stiff bank, near a road.

(2099) *Halcyon gural*, Monghyr, June 4th.

4. R.  $\frac{1.09}{1.02}$

Pure white. Gallery 1 foot in a stiff bank, in jungle.

(2100) *Merops erythrocephalus*, Mergui, March 3rd.

5. 6. P. O.  $\frac{0.84}{0.79}$

Pure white. Gallery from 1 to 7 feet in length, in soft sandy soil near water. It enters the ground at a small angle and then runs horizontally.

(2101) *Eudynamys orientalis*; Monghyr, June 3d.

1. O. P.  $\frac{1.20}{0.90}$

Pale dirty green much blotched with reddish brown. Had but one egg brought, and the man reported four crow's eggs in the same nest.

(2102) *Centropus rufipennis*, Monghyr, "Mahoka" "Karmowa" June, August.

4 O.  $\frac{1.30}{1.09}$   $\frac{1.47}{1.21}$

Pure white: nest placed in dense trees, a neat but loose structure of twigs domed, and with aperture in the side: lined with dried leaves.

(2103) *Cypselus affinis*, Monghyr, May June.

4. O. P.  $\frac{0.90}{0.56}$

Pure white; nest described in a former paper. Mr. Layard, however, describes it as building a *mud* nest in Ceylon (vide annals for 1853, page 311).

(2104) *Cypselus balasiensis*, Monghyr, June 3rd, Prome, July.

3. L. P.  $\frac{0.80}{0.45}$

Pure white. Nest of vegetable down, with a few feathers agglutinated with mucus to the frond of the *Borassus*.

(2105) *Corvus culminatus*, Tenasserim, February 3rd. Near Deoghur, March 4th.

O. P.  $\frac{1.66}{1.15}$

Dull sap green, much blotched with brown. Nest carefully placed in tall trees.



# OOLOGY.

(2106) *Acridotheres tristis*, Monghyr, June, 1st. Prome, July 3rd (2nd brood.)

5. O. P.  $\frac{1.20}{0.85}$

Pale green. Nest in trees or holes in houses of grass and rubbish.

(2107) *Sturnus contra*, Monghyr, May 3rd, June 3rd, Tavoy, April 1st.

5. O. P.  $\frac{1.10}{0.82}$

Clear pale green. Nest of grass and twigs in trees.

(2108) *Malacocercus bengalensis*, Monghyr, June 2nd. "Fat-gobria," "Gogoi,"

5. B. O. P.  $\frac{1.00}{0.79}$

Deep bluish green. Nest of twigs and fibres in bushes.

(2109) *Malacocercus caudatus*, Monghyr, June, July.

4. 5 O. P.

Nest and eggs, previously described.

(2110) *Neornis flavolivacea*, Darjiling, July 2nd.

3. B. O. P.  $\frac{0.9}{0.55}$

Deep dull claret red, with a darker band at broad end. Nest, a deep cup, outside of bamboo leaves, inside fine vegetable fibres, lined with feathers.

(2111) *Orthotomus longicauda*, Darjiling, August 4th, Tavoy, May 1st.

4. O. P.  $\frac{0.61}{0.45}$

Greenish white, dotted with pale reddish. Nest, a neat cup of fibre and vegetable down enclosed in a single leaf, which is secured by stitches of fibre; so as to envelope its entrance at the top and beneath the stalk, the leaf serving as an admirable pent roof to the nest.

(2112) *Thamnobia Cambaiensis*, Monghyr, April 2d, June 3rd.

3. 4. O. P.  $\frac{0.64}{0.64}$

Greenish white, ringed and spotted with pale reddish, with some spots of neutral. Nest rude in holes, in trees and banks, of grass and nearly always snake skin.

(2113) *Hirundo domicola*, Tenasserim, April 2nd.

3. L. O. P.  $\frac{3.77}{0.52}$

White, spotted and ringed with umber. Nest a saucer of mud, inner part coarse roots, profusely lined with feathers, and vegetable down, attached to the under part of "Snags" projecting some 4 feet above the water.

# OOLOGY.

(2114) *Hirundo sinensis*; Salween R., January 2nd.

4. O. P.  $\frac{0.62}{0.48}$

Pure white. Nest of grass and lined with feathers.

(2115) *Pycnonotus hæmorrhous*; Monghyr, June 4th.

3. O. P.  $\frac{0.90}{0.68}$

Nest and eggs like *P. bengalensis*, previously described; eggs not quite so highly coloured.

(2116) *Nectarinia flammaxillaris*; Tavoy, February 1st.

2. O. P.  $\frac{0.56}{0.43}$

Pale greenish, speckled with greyish ash. Nest, a neat purse, in a lime tree (*Citrus*), like *N. asiatica*.

(2117) *Macrophygia leptogrammica*; Darjiling, July 2d.

O.—(1?)  $\frac{1.40}{0.98}$

Dirty white; nest, a few sticks.

(2118) *Fraulinus sinensis*; var. *Phayrei*; Burmah, June 4th (Miateh)

4. R. P.  $\frac{1.40}{1.15}$

Uniform greenish cream; on the ground.

(2119) *Turnix Ocellatus*, Monghyr, June 1st.

4. R. P.  $\frac{0.88}{0.74}$

Yellowish grey, closely freckled with dark yellowish grey, blotched with deep reddish umber with a few dots of neutral: on ground.

(2120) *Glareola lactea*, Tenasserim, March 3d.

B. P. (3?)  $\frac{1.01}{0.81}$

Dusky buff, ringed and spotted with obscure neutral and irregularly lined with yellowish brown. On churs and river sand banks.

(2121) *Ædicnemus crepitans*, Deoghur, April 1st.

2. O. P.  $\frac{1.80}{1.35}$

Pale stone-colour or yellowish cream, blotched with deep red brown. On ground in sal jungle.

(2122) *Hoplopterus ventralis*, Tenasserim, March 3d.

3. P.  $\frac{1.60}{1.17}$

Yellowish stone-colour or creamy nankeen, regularly spotted with deep red brown and sparingly blotched with neutral. On sand-banks in the river.

(2123) *Metopodius indicus*, Monghyr, August.

L. O. P.  $\frac{1.50}{0.97}$

# OOLOGY.

Clear brownish-ochre, strongly lined and streaked with black. Nest of weeds in jheels.

(2124) *Hydrophasianus chirurgus*, Monghyr, August 2nd,

4. P.  $\frac{1.33}{1.10}$

Clear brownish or greenish bronze: nest, weeds in jheels.

(2125) *Ciconia leucocephala*, Deoghur, June 4th.

3. P. O.  $\frac{2.50}{1.90}$

Dull white: nest of sticks placed in tall trees, usually "simul," most difficult to ascend.

(2126) *Herodias intermedia*, Monghyr, July 1st, 2nd.

6. O. P.  $\frac{1.76}{1.26} \frac{1.94}{1.30}$

Dull green. Nest small, of sticks; in company with "Mainas" and *Herodias bubulcus* and *H. garzetta*.

(2127) *Herodias garzetta* Monghyr, July 1st.

6. O. P.  $\frac{1.45}{1.14} \frac{1.58}{1.11}$

Dull green. Nest as *H. intermedia*.

(2128) *Herodias bubulcus*, Monghyr, June 1st.

6. 8. P. O.  $\frac{1.80}{1.39}$

Very pale green or greenish-white. Nest as *H. intermedia*.

(2129) *Porzana phænicura*; Monghyr, August 1st.

7. L. O. P.  $\frac{1.70}{1.10}$

Dark brownish cream, much spotted and blotched with brownish red. Nest of weeds in jheels.

(2130) *Gallinula Burnessii*, Salt Range, August 4th.

$\frac{1.62}{1.15}$

Pinkish cream or grey, spotted and ringed with deep red brown. Nest of weeds in jheels.

(2131) *Dendrocygna awsuree*, Monghyr, August 1st.

8. O. P.  $\frac{1.81}{1.50}$

Creamy white, nest of weeds in jheels.

(2132) *Nettapus coromandelianus*, Monghyr, August.

O.  $\frac{1.47}{1.10}$

Pure white, shell very thin.

The nomenclature used above is derived from the valuable catalogue of birds in the Museum

# ORANG-UTAN.

of the Asiatic Society, by Mr. Blyth; a work of great labour, which reflects the utmost credit on its author.)—*Beng. As. Soc. Jour. Jan. Oct. 1855.*

(2133) *OPHELIA ELEGANS*,

(Wight) Ic. Pl. Ind. Or. t. 1331. Erect, ramous above, obsoletely 4 sided. leaves sessile, narrow, ovate, lanceolate tapering to a slender point, 5 nerved; lateral nerves close to the margin: branches ascending, slender, bearing at each joint lateral, few flowered cymes, forming together a large many-flowered leafy panicle: calyx lobes narrow, lanceolate, acute, about two-thirds the length of the corolla: lobes of the corolla obovate cuspidate: foveæ bound with longish coarse: hairs flowers pale blue.

Pulney Hills, flowering August and September. A very handsome species when in flower, forming as it does, a rich panicle of light blue flowers streaked with deeper coloured veins. It seems very distinct from all the other species.—(Wight).

This plant grows plentifully in the Jeypoor Zemindary of Vizagapatam, and is largely exported as "Silaras" or "Selagit," the amount being valued at about rupees 2,500 a year. It is preferred by the hukeems to the genuine Himalayan Chiretta, and is considered febrifuge. (Honorable W. Elliot in literis).

The drug as exported, in bundles about 16 inches long, and 4 inches deep, and is always tied up with the tough bark and large leaves of *Bauhinia Vahlia*; (W and A.) which abounds in the Northern Circars.

Therapeutic Action.—Equal quantities of the *Exacum bicolor*, *Ophelia elegans* and of the *Chiretta* of the medical stores (which on examination was found to contain some stalks of the *Ophelia elegans*) having been infused, in the usual manner, (2 oz. to 1 pint,) four competent parties were requested to give their opinion on the respective qualities of the infusions. The result was the unanimous opinion that the cold infusions of *Exacum bicolor*, although a pure bitter, was much milder than that of *Ophelia elegans*, which possesses a powerful bitterness, remaining for several minutes in the mouth. Frequent trials confirm the belief that it exercises a tonic influence on the digestive organs, thereby improving the general health, while it appears also to have a febrifuge property.

(2134) *ORANG-UTAN*. Or remarks on the different species of *Orang-utan*.—By EDWARD BLYTH.

The Bengal Asiatic Society's museum received from Sir James Brooke of Sarawak seven skeletons of large adult *Orang-utans* and the results of Mr Blyth's examination of them, were given as a sequel to his former memoir on the genus published in the 22nd volume of the Society's Journal.

Of these seven skeletons, five are referable to the *Mias Rambli* of Sir J. Brooke; although



one of them (a small but full grown female) is marked by himself *M. Pappan*; and another is sent by the new name *M. Chapin*, which is also that of an old female animal, remarkable for its extraordinarily large and vertically elongated orbits. It is probable that this alleged *Chapin* merely represents an individual variation; and Sir J. Brooke states, in his letter announcing the presentation, that some of these skeletons had been labelled by him with the names specified by Natives, who, accordingly (as may be supposed in such a case), are not particularly conversant with the osteological distinctions of the different species.

The sixth skeleton is that of an old female of the *Mias Pappan*, with double-crested skull like that of the male figured in illustration of his former memoir. It even exceeds that male in size, but the skull is smaller; and the sexual distinctions of the two are unmistakeable. In this female, the epiphyses of the limb-bones, *scapulae*, *ilia*, &c. are thoroughly anchylosed, denoting completion of growth; even the *symphysis pubis* is united (with much irregular deposition of bone externally), and the sacro-iliac symphysis on the right side only. In no other of our orang skeletons are the two latter symphyses united. Our male *Pappan* had not quite completed his growth; for some of the epiphyses are loose, and others are but partially soldered: those of the *humeri* are fixed and semi-anchylosed; as are also those of the left *radius* and *ulna*; but the epiphyses of the right *radius* and *ulna* are detached; those of the *scapulae* and *ilia* are fixed but slightly, and those of the *ischia* more extensively. This animal had therefore (as will be attempted to be shown presently) not completed its full growth: the female being much more advanced in age, with its teeth proportionally worn down. On comparison of the skulls of the two sexes, that of the female is seen to be smaller, with the maxillæ less protruded, increasing the facial angle from  $32^{\circ}$  to  $35^{\circ}$ ; the zygomatic arch is much less robust; and the longitudinal grinding surface of the upper molars less by  $\frac{3}{16}$  in., while that of the lower molars is less by  $\frac{1}{4}$  in. than in the youthful male presented by Mr. Nicholls, and by  $\frac{7}{16}$  in. than in Dr. Clarke Abel's Sumatran male. In the form of the ascending ramus of the lower jaw, this female specimen more nearly resembles the Sumatran male referred to than any other of our numerous specimens; but the condyle is considerably larger; and, as compared with Mr. Nicholl's Bornean male, the antero-posterior diameter of the ascending angle is much less; being in the Bornean male (on a level with the surface of the grinders)  $2\frac{5}{8}$  in.,—in Abel's Sumatran male but  $2\frac{1}{4}$  in.,—and in Sir J. Brooke's Bornean female  $2\frac{1}{2}$  in. Lastly, this Bornean female presents the very extraordinary anomaly (throughout the series of placental main-

malia) of a fourth true molar above and below, though on the left side only: that of the upper jaw being of small size and round form, its crown scarcely exceeding that of an upper false molar of *Macacus rhesus*; and it is placed posteriorly to the ordinary last true molar on a line with its outer surface, that tooth having been pressed a little inward: in the lower jaw the accessory fourth true molar is very little smaller than the normal molars; and it projects from the internal margin of the anterior surface of the ascending angle of the jaw, its crown being directed obliquely inwards much more than forwards or upwards: as a functional tooth, it must, therefore, have been almost useless; though the outer or upper margin of its crown is a little worn down by attrition, as is also the outer cusp of the small accessory molar above. This old female *Pappan* had been badly wounded in its day; having had its left humerus severely fractured, and the fibula of that side also broken; the fractured bones having healed; the unset humerus, however, in an extraordinary manner, exhibiting two large and deep perforations in the great lumpy mass of united bone, where suppuration had ensued, and large shot had probably been ultimately discharged from the orifices.

The seventh skeleton is that of a species altogether distinct and new! Although that of a large old male, with the cranial sutures much obliterated, and the anchylosis of the epiphyses of its limb-bones complete, it is very remarkable for the comparatively slight protrusion of the jaws, and the consequently increased facial angle; apparently, however, to a greater extent than really, from the flatness of the face, the unusually slight protrusion of the sockets of the upper incisors, and, above all, the elevation of the condyle of the lower jaw raising so considerably the occipital portion of the skull and consequently the auditory orifice. The facial angle does not actually exceed  $32\frac{1}{2}^{\circ}$ ; while in the two *Rambis* (male and female) figured in my (Mr. Blyth's) former memoir, it is as low as  $30^{\circ}$ —(this being also Prof. Owen's estimate of his adult skulls of the *Rambi*). The *zygomata* (or cheek-bones) are unusually prominent. The canines, incisors, and the first three upper molars on each side, are exceedingly much worn down by attrition; the canines even to a level with the other teeth; but the circumference of these canines, especially in the lower jaw, is conspicuously less than in males and even large females of the *Rambi* and *Pappan*; though they are proportionally larger than in the *Kassar*. It is further remarkable that the frontal ridges of the skull, instead of uniting upon the vertex to form a single sagittal crest (as in the *Rambi*), or continuing separate and well apart throughout (as in the *Pappan*), approach to contact upon the vertex but without uniting; which is very likely to prove a constant and specific distinction.

tion, as the present old male shews much irregular deposition of bone externally to its contiguously double sagittal crest. The long bones of the limbs, though fully as stout as in the *Rambi* and *Pappan*, and about twice as stout as those of our old female *Kassar*, yet probably do not exceed the corresponding bones of the full grown male *Kassar* in length; being very much shorter than those of the adult *Rambi* and *Pappan*; and this remarkable brevity of limb, combined with the conspicuous differences in the skull and sundry other distinctions, can scarcely be considered otherwise than as indicative of specific peculiarity.

Of the five *Rambis* sent, there is unfortunately no specimen of a male of the largest size, comparable to that of which the skull is figured in the 1st and 2nd plates accompanying the former memoir: but there are two large full-grown females (including that ticketed *Mias Chapin*), and also a full grown female of smaller dimensions (which was labelled *M. Pappan*;) with a male of superior age and stature to the male *Pappan* presented formerly by Mr. Nicholls; and also a young male, with the last molars brought into wear, but which nevertheless had not nearly attained its full growth, which bade fair to rival that of the gigantic Sumatran male already noticed.

The specimen to which the name *Mias Chapin* was attached, appears (as already mentioned) to be a large old female *Rambi*, very remarkable for the enormous size and vertically elongated form of its orbital cavities, which measure 2 in. by nearly  $1\frac{3}{4}$  in. across. Its skull is larger, though less massive, than that of the female *Rambi* figured in the former memoir: the muzzle is conspicuously more slender, measuring but  $2\frac{5}{8}$  in. in greatest width (outside the canines), instead of  $2\frac{7}{8}$  in.: and whereas the coronoid process of the lower jaw in the former specimen is smaller and about on a level with the condyle, in the present example (labelled *Chapin*) the posterior or condyle process is unusually prolonged, and raises the skull (with lower jaw *in situ*) so remarkably, that placing it on a level surface together with the other skull noticed, the zygoma of the so-called *Chapin* not only overlaps that of the other, but its lower edge is about  $\frac{1}{16}$  in. higher than the upper edge of the zygoma of the other specimen: \* the nasal bones, which in the other are united and ascend to the very summit of the *glabella*, in this skull continue separate, and reach only to the lower portion of the *glabella*. This skeleton is very deficient, wanting the *sacrum* and most of the bones of the hands and feet: but all of the long bones are present, with the shoulder-blades and rest of the *pelvis*; the epiphyses being completely soldered. The limb-bones are even rather longer than in the great female *Pappan*, and in fact exceed in length those of any other of our full-grown speci-

mens: the *humerus* measuring 15 in., the *ulna* (to tip of styloid process)  $15\frac{3}{4}$  in.; femur  $11\frac{1}{2}$  in.; and tibia  $10\frac{1}{3}$  in.: circumference of middle of trunk of humerus  $3\frac{1}{8}$  in.; and of femur  $2\frac{7}{8}$  in. The few digital bones seem to accord in dimensions with the corresponding bones of our male *Pappan*. The extreme length of the *scapula* is  $8\frac{1}{4}$  in.; and of *pelvis*  $10\frac{7}{8}$  in.: clavicle 8 in. This specimen is marked as having been procured in Sadong (in Borneo).

\* In Prof. Owen's figure of a female *Rambi* skull (*Zool. Trans.* I, pl. 35), the condyle-process is similarly elongated.

The next specimen, which was erroneously marked *Pappan*, we consider to be a small female *Rambi*, though fully mature and even old, as shewn by the almost complete obliteration of the cranial sutures, the ankylosis of the various epiphyses, and the amount of attrition of all the teeth. The cranial ridges are very small; and the sagittal crest is hardly at all raised, but nevertheless exhibits a tendency to rise along the median line of the skull, between the frontal ridges which converge from the temples, and to be prolonged in front, anterior to the convergence of the latter, which takes place unusually far back: the nasal bones are united and singularly minute, actually not rising so high as the wide part of the orbital cavities; and the latter are small and circular, measuring barely  $1\frac{3}{8}$  in every way. The skull considerably resembles that of the female *Rambi* formerly figured, only that the sagittal crest is so much smaller; the *zygomata* being also more raised (in consequence of the greater prolongation of the condyle process of the lower jaw); and the orbits are smaller and more circular, and surmounted by much slighter ridges: consequently the face is flatter, and the sockets of the incisors are also less protruded. The skeleton is unfortunately very imperfect, wanting most of the bones of the hands and feet, and one *tibia* and *fibula*: a portion of the lower jaw, with the canine, first præmolar, and part of the second, is also lost: but the other long bones are present, and the *pelvis* is complete. Length of *humerus* but  $13\frac{1}{2}$  in.; of *ulna*  $13\frac{7}{8}$  in.; of *femur*  $10\frac{3}{8}$  in.; and of *tibia* 9 in.: circumference of middle of *humerus*  $2\frac{7}{8}$  in.; and of *femur*  $2\frac{3}{4}$  in.: metacarpal bone of middle finger  $3\frac{1}{8}$  in. metatarsal of corresponding toe  $3\frac{3}{4}$  in.: *os calcis* 2 in.: Total length of *scapula* (with *acromion*  $1\frac{1}{8}$  in.; and of *pelvis*  $9\frac{7}{8}$  in.; extreme breadth apart of the *ilia* (or hips)  $10\frac{7}{8}$  in.: clavicle  $6\frac{3}{8}$  in. This specimen also is marked from Sadong in Borneo.

The third female *Rambi* is of large size and fully mature, with the various epiphyses well soldered: but it has even less trace of sagittal crest than the last; the frontal ridges meeting as far back upon the skull, but not quite uniting, and a small mesial ridge rising between them above the vertex: the orbits are moderately



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large and a little elongated vertically, measuring  $1\frac{5}{8}$  by  $1\frac{1}{2}$  in.; and the nasal bones are united and ascend a little into the glabella. Size about that of the first specimen (marked *Chapin*), but the muzzle rather broader or  $2\frac{1}{16}$  in. This specimen is nearly perfect: but the face is disfigured by a bullet which had knocked away the inner half of the right orbit and a tolerably large piece from the occiput; which fragments are lost. Length of *humerus*  $14\frac{3}{4}$  in.; *ulna*  $15\frac{1}{4}$  in.; *femur*  $11\frac{5}{8}$  in.; *tibia*  $10\frac{5}{8}$  in.: circumference of middle of trunk of *humerus* 3 in.; and of *femur*  $2\frac{3}{4}$  in.: metacarpal bone of second or middle finger  $4\frac{5}{16}$  in.; first phalanx of ditto  $3\frac{1}{16}$  in.; second phalanx  $1\frac{1}{16}$  in.: metacarpal bone of thumb  $2\frac{1}{8}$  in.; first phalanx of ditto  $1\frac{1}{8}$  in.: metatarsal bone of middle toe  $3\frac{1}{8}$  in.; first phalanx of ditto  $2\frac{1}{8}$  in.; second phalanx  $1\frac{3}{4}$  in.: metatarsal bone of hallux  $2\frac{1}{16}$  in.; first phalanx of ditto  $1\frac{3}{16}$  in.; and ungual (!)  $\frac{1}{16}$  in. Total length of *scapula*  $9\frac{1}{4}$  in.; *clavicle*  $7\frac{5}{8}$  in.; extreme length of *pelvis*  $11\frac{1}{4}$  in.; and extreme breadth of *pilia* 12 in.

The two remaining *Rambis* are males: and the first to be noticed is a young animal, whose skull had obviously not attained its full dimensions, though the last true molars had been brought into wear: but the general massiveness of this skull indicates that the animal would probably have become a male of the largest size: the sagittal crest had begun to rise on a grand scale; and the frontal ridges converge directly to it, although these are scarcely indicated for  $\frac{3}{4}$  in. before their junction. The teeth are more crowded than in the full grown animal; the inter-space between the upper canine and outer incisor, which in our large Sumatran male, is  $\frac{3}{8}$  in., being scarcely  $\frac{1}{4}$  in.; and the first false molar, instead of being completely posterior to the canine, advances considerably on its outer surface posteriorly; in the lower jaw, also, there is a bony inter-space between the canine and first false molar in the large mature male, but not in the adolescent male: nasals partially ankylosed, and continued upward to the lower part of the *glabella*: epiphyses of the *humeri* considerably ankylosed, and also, those of the *tibiae* and *fibulae* but not of the *radii* and *ulnae*. This skeleton also is tolerably complete. Length of *humerus*  $14\frac{5}{8}$  in., of *ulna*  $13\frac{3}{4}$  in.; of *femur* 10 in.; and of *tibia* 9 in.: circumference of middle of trunk of *humerus*  $2\frac{1}{16}$  in., and of *femur*  $2\frac{5}{16}$  in.: metacarpal bone of middle finger (the epiphyses beginning to ankylose)  $3\frac{3}{4}$  in.; first phalanx of ditto  $2\frac{7}{8}$  in.; second phalanx  $1\frac{7}{16}$  in.: metacarpal of thumb  $1\frac{7}{8}$  in.; metatarsal of middle toe  $3\frac{9}{16}$  in.: first phalanx of ditto  $2\frac{3}{4}$  in.; second  $1\frac{5}{8}$  in.: metatarsal of hallux  $1\frac{7}{8}$  in.; *Clavicle*  $6\frac{1}{8}$  in. Extreme length of *scapula* (minus epiphysis)  $7\frac{1}{2}$  in.: of *pelvis* (with ischial but not iliac epiphysis)  $9\frac{3}{4}$  in.; and extreme breadth at the hips  $10\frac{1}{4}$  in.

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The next is a mature male, but certainly not of the largest dimensions: being about the size of the great females already described; and not otherwise recognisable from them than by the general massiveness of the skull (which is remarked at the first glance), and less conspicuously than usual in the present instance, by the form of the *pelvis*. The superciliary ridges are much broader than in any female skull; and the *zygomata* equally robust: the sagittal crest is also broad and well developed: nasals distinct, and reaching up to the lower part of the *glabella*. Skeleton tolerably complete; wanting most of the ungual phalanges and some other small bones. Length of *humerus*  $14\frac{3}{4}$  in.; of *ulna* (with loose epiphysis)  $15\frac{1}{8}$  in.; of *femur*  $11\frac{1}{8}$  in.; *tibia*  $9\frac{7}{8}$  in.: circumference of middle of trunk of *humerus*  $3\frac{1}{8}$  in.; and of *femur*  $2\frac{3}{4}$  in.: metacarpal bone of middle finger  $4\frac{1}{4}$  in.; first phalanx of ditto  $3\frac{1}{16}$  in.; second phalanx  $1\frac{1}{16}$  in.: metacarpal of thumb  $1\frac{3}{16}$  in.; first phalanx  $1\frac{1}{8}$  in.: metatarsal of middle toe  $4\frac{1}{8}$  in.; first phalanx of ditto  $2\frac{1}{8}$  in.; second phalanx  $1\frac{1}{16}$  in.: metatarsal of hallux  $2\frac{1}{16}$  in.; *clavicle*  $7\frac{1}{4}$  in.; *scapula*  $8\frac{3}{8}$  in.; *pelvis*  $10\frac{3}{4}$  in. in extreme length, and  $11\frac{3}{4}$  in. broad at the hips. This specimen was marked *Mias Rambis* by Sir J. Brooke; and is also from Sadong in Borneo: the three skeletons received from Sadong having unfortunately been prepared by interment in the ground; and the present being the most complete of them and otherwise the least injured.

We now come to the female *Pappan* already noticed; which, though of greater size than the male described on a former occasion, with considerably longer and broader *pelvis*, has nevertheless a smaller skull, less prominently developed jaws, and conspicuously smaller teeth: the *zygomatæ* arch is shorter and a little weaker than in the male; but the superciliary ridges and width of the bony orbits are much the same, and in fact there is little further difference between the two skulls: the bony crests on the vertex are less prominent in the female, and they approach to within  $\frac{3}{4}$  in. of each other; whereas in the male they remain 1 in. apart where most approximated: length of base of skull, from between the middle incisors to the anterior margin of the occipital foramen,  $6\frac{7}{8}$  in. in the male, and  $6\frac{1}{8}$  in. in the female: breadth of *zygomata* apart  $6\frac{5}{8}$  in. in both. This skeleton is also nearly perfect. Length of *humerus* 15 in.; of *ulna*  $15\frac{5}{8}$  in.; *femur*  $11\frac{1}{2}$  in.; *tibia*  $10\frac{5}{8}$  in.; circumference of middle of trunk of *humerus*  $3\frac{1}{4}$  in.; of *femur* 3 in.; metacarpal bone of middle finger  $4\frac{1}{8}$  in.; first phalanx  $3\frac{1}{8}$  in.; second  $1\frac{1}{16}$  in.; metacarpal bone of one thumb 2 in., of the other somewhat less and, bearing a very short first phalanx, only  $\frac{7}{8}$  in.; metatarsal bone of middle toe 4 in.; first phalanx 3 in.; second  $1\frac{3}{8}$  in.; metatarsal of hallux  $2\frac{1}{2}$  in.; *clavicle*  $7\frac{1}{4}$  in.; *scapula*

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$8\frac{1}{2}$  in. in extreme length: and *pelvis*  $10\frac{1}{2}$  in. long, and  $11\frac{1}{4}$  in. broad at the hips.

Lastly, we arrive at the new species, which may be designated *PITHECUS CURTUS*. It is perhaps the genuine *Mias Chapin* of the Dyaks. The specimen is decidedly male, and well advanced in years; and the skull has a more anthropoid appearance than that of any other Orang known. This chiefly results from the much reduced prolongation of the muzzle, while the cheek-bones project remarkably, giving a sort of Kalmuk expression to the skull! The absolute projection of the maxilla, in a horizontal line carried from the lower margin of the orbital ring, is, in our large Sumatran male *Rambi* skull, fully 3 in.; in the male *Pappan* it is about the same; in the female *Pappan*  $2\frac{1}{2}$  in.; in the old female *Kassar* (a much smaller animal) about  $2\frac{1}{4}$  in.; and in the great male *CURTUS* barely 2 in.! Extreme breadth of *zygomath* 7 in.: height of the skull, with lower jaw *in situ*, 11 in.: length, in a straight line, from the summit of orbital cavity to between the incisors.  $4\frac{1}{4}$  in. (the same measurement being of the male *Rambi*  $5\frac{1}{8}$  in., and in the male *Pappan*  $4\frac{5}{8}$  in.): length from occipital foramen to base of upper incisors 6 in. (in the male *Rambi*  $7\frac{1}{8}$  in. and male *Pappan*  $6\frac{7}{8}$  in.): length of bony palate 3 in. (in the others  $3\frac{7}{8}$  in., and  $3\frac{5}{8}$  in.): orbital cavities  $1\frac{5}{8}$  by  $1\frac{1}{2}$  in. across: extreme width of bony orbits apart externally 5 in.: extreme breadth of ascending ramus of lower jaw  $3\frac{7}{8}$  in.; height of the condyle  $4\frac{3}{8}$  in.; length of grinding surface of the upper molars  $2\frac{1}{8}$  in. The skeleton is fortunately nearly perfect. Extreme length of *humerus*  $13\frac{1}{4}$  in.; *ulna*  $14\frac{3}{8}$  in.; *femur*  $10\frac{3}{8}$  in.; *tibia*  $9\frac{3}{8}$  in.; circumference of middle of trunk of *humerus*,  $3\frac{1}{4}$  in.; of *femur*  $2\frac{7}{8}$  in. (length and circumference of *humerus* of old female *Kassar*  $12\frac{3}{4}$  and  $2\frac{1}{4}$  in.; ditto of *femur*  $9\frac{7}{8}$  in. and  $2\frac{1}{4}$  in.): length of metacarpal bone of middle finger  $3\frac{7}{8}$  in.; first phalanx of ditto  $2\frac{1}{8}$  in.; second  $1\frac{1}{8}$  in.; metacarpal bone of thumb  $2\frac{1}{8}$  in.; first phalanx  $1\frac{1}{8}$  in.; metatarsal bone of middle toe  $3\frac{1}{8}$  in.; first phalanx  $2\frac{3}{4}$  in.; second  $1\frac{5}{8}$  in.; metatarsal bone of *hallux* 2 in.; clavicle  $6\frac{7}{8}$  in.: extreme length of *scapula*  $8\frac{3}{4}$  in.: of *pelvis*  $10\frac{1}{8}$  in.; and breadth at the hips 11 in. Length of the vertebral column, from atlas to *sacrum*, measured internally,  $16\frac{1}{4}$  in.; in the scarcely full grown male *Pappan*,  $17\frac{1}{2}$  in., and in the old female *Kassar*,  $15\frac{1}{4}$  in.: *axis*-vertebra soldered to the next. As compared with the *Rambi* and *Pappan*, the metacarpals and metatarsals are shorter, and the first phalanges of the fingers and toes are longer.\* A friend who has resided long in Borneo and has examined numerous skulls of Orang-utans (including those which have passed through the hands of Sir J. Brooke), informed Mr. Blyth, that he has remarked in the adult and aged specimens of the *Rambi* and *Pappan*, that, the canines are

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always perfect; whereas in those of the small *Kassar* they are as regularly broken or worn down to about a level with the incisors. This remark is borne out by the series of skulls now under examination. The canines are long and unbroken in all the specimens of the *Rambi* and *Pappan*; and are ground down in the old female *Kassar*, and also in the old male *P. CURTUS*! Denoting probably a difference of food. Moreover, the same gentleman informs me that different species of these animals do not appear to inhabit the same district; and he thinks that the *P. OWENII* represents, in the southern part of the great island, the *P. MORIO* of the northern part.

With the grand series of skulls and skeletons of adult Orang-utans now subjected to examination, amounting to twelve in all (*viz.* 3 males and 4 females of *PITHECUS BROOKEI* or *Mias Rambi*, 1 male and 1 old female of *P. SATYRUS* or *M. Pappan*, one old male of the *P. CURTUS* or *M. Chapin*?, an old female of the *P. MORIO* or *M. Kassar*, and the adolescent female with short fore-arms, provisionally designated *P. OWENII*,—in addition to Prof. Owen's excellent lithographs of the male *Kassar* and of male and female *Rambi* in the *Trans. Zool. Soc.*, Vols. I and II), the observer is first struck with the very obvious and conspicuous distinctness of the comparatively puny *Mias Kassar*, and of the adolescent small skeleton, from all the rest. The next glance suffices to separate the *Rambi*, *Pappan*, and *P. CURTUS*: the last being quite as thoroughly distinguished apart by the *tout ensemble* of its appearance, as the *Pappan* is by its conspicuously double-crested vertex. No zoologist, accustomed to the discrimination of specific characters, would hesitate, with the present series of skulls before him, to acknowledge the distinctness of each of these three, but such an observer would ponder for a while over the remarkable female *Rambi* skull with enormous and vertically oblong orbits, and would doubtless hesitate in regarding it as specifically identical with the old female *Rambi* of small size; so great is the contrast between them. Presuming, however, that he arrived at the conclusion here ventured upon, it still follows that the *Rambi* is subject to an extraordinary amount of variation for a wild animal; and this, although it may not invalidate the opinion of its distinctness from the *Pappan* and *P. CURTUS*, nevertheless prompts a reconsideration of the grounds for the view formerly expressed, with regard to the specific distinctness of the small specimen having short fore-arms. From the detached state of the epiphyses of its limb-bones, it is certain that that specimen was not full-grown; and as those of the *ulna* at least (as shewn by the adult male *Rambi*, and also by that of the male *Pappan*), are the last become ankylosed, it should follow that the fore-arm continues to



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increase in length after the upper arm and the leg had ceased to grow : but the difference is still too great to be thus accounted for satisfactorily : and upon re-comparison of this specimen with the undoubtedly aged female *Kassar*, Mr. Blyth, deem it prudent to await the further evidence which Sir J. Brooke has kindly promised that he would endeavour to procure and send, before venturing to confirm or modify his previously expressed opinion on the subject.

This fact would appear certain, that the partial ankylosis of the epiphyses of the limb-bones does not rigorously denote cessation of growth, unless the female Orangs attain to greater stature than the males, which is most unlikely. It would seem rather, that as the earthy salts are continuously absorbed and re-deposited, some continuance of extension supervenes, until finally checked and stopped by the considerably increased deposition of bone. The skull also continues long to increase in size; after the last true molars have been brought into use.

As regards the sexual distinction, a practised eye discerns it readily in the adult skull, by its superior general massiveness in the male; and, in the skeleton, the larger and broader *pelvis* of course denotes the female animal, combined with a proportionally smaller and less robust skull than in the other sex. There is no reason to doubt the correct determination of sex in any one of the specimens here noticed.

The occasional but rare occurrence of the ungual phalanx to the *hallux* or great toe, would seem to be proper to no particular sex or species; for it exists in the male *Pappan* from Sumatra, and in the female *Rambi* from Borneo.

It now remains to connect the osteological with the external characters of the different species; to determine the stature attained by the largest males of the *Rambi*, *Pappan*, and also *Kassar*, to obtain further information of the *PITHECUS CURTUS*, and to verify or otherwise the *P. OWENII*. With the powerful aid of the accomplished Raja of Sarawak, we trust to be enabled ere long to resolve these various problems.

(2135) *OVIS AMMON?* Pallas. vel. "*O. Ammonoides*," Hodgson. The "*Nian*" or "*Nyna*" of the Bhoteahs.—(Pronounced nasally in one syllable.)

Measurement of a male of five years, according to the markings on the horns.

	Ft.	In.
From nose to base of horns. ....	1	1
Thence to insertion of tail. ....	5	1
Tail to end of hair. ....	0	3
Total, ...	6	5.

	Ft.	In.
Circumference of horn at base, ...	1	4 $\frac{3}{4}$
Length on the curve, tips broken. 2	10 $\frac{1}{2}$	

Winter pelage, above deep brown interspersed

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with grey, with a distinctly marked darker dorsal line, passing, (as in *O. montana*.) in a narrow stripe through the disc on the croup, even to the tip of the tail. Sides mixed hoary or slaty grey crown; disc on the croup well defined and dirty white, the hair appearing as if rubbed. The throat and neck beneath to the breast, white, sprinkled with scattered brown hair; the hair long, bushy and pendent; and from 6 to 7 inches in length, while that of the back is barely 2 inches, except on the dorsal line, where it is 3 inches, and on the ridge of the neck above 3 $\frac{1}{2}$  inches. Tail, above, brown, whitish at the sides, naked beneath. Under parts dirty white; medial line blackish, outside of the limbs with a dark list; lips, whitish; face paler brown than the body.

Front surface of horns, ..... 3 $\frac{1}{2}$  inches wide.

Inner lateral surface, ..... 6 inches wide.

Measurement of the bare skull of a male seven years old.

	Ft.	In.
Length of face to base of horns, ...	1	1
Length of horn on the curve, ..... 2	10	
Basal circumference, .....	1	4 $\frac{3}{4}$

These horns are weathered and much broken at the tips, and were probably about 3 ft. 3 inches long.

Description of a female, 6 years old by the marking of the horns.

	Ft.	Ins.
Nose to base of horns, .....	0	10 $\frac{1}{2}$
Thence to insertion of tail, ...	4	5
Tail, .....	0	3
Total, .....	5	6 $\frac{1}{4}$

	Ft.	Ins.
Length of horns on the curve, 1	4 $\frac{1}{2}$	
Basal circumference, .....	0	8

In the female, the colouring is lighter than that of the male, having more grey; and the throat and foreneck are slaty instead of white, and devoid of the long pendent frill which graces the other sex; the dark dorsal line, which in the male runs in a narrow stripe through the pale disc, ends in the female at the commencement of the disc, and the tail and croup are of the same canescent fawn colour; the disc is far more extensive than that of the male. Along the ridge of the neck above, from the base of the horns to about 10 inches beyond them, there is a mane of true woolly hair 6 $\frac{1}{2}$  inches long, gradually fading into the crisp quilly hair of the dorsal line. There is no dark list down the outside of the limbs, but the colour is pale fawn.

Front surface of horns, ..... 1 $\frac{3}{4}$  Ins. broad.

Inner lateral surface, ..... 3 „ inches.

In both sexes there is a beautifully soft inner coating of fine pushmeena wool of a pale mouse colour.

The height of the animals is not given, as the limbs are defective in the specimens.

The above measurements were taken with care,

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and although the male appears somewhat superior in size to Mr. Hodgson's, the general correspondence is evident enough.

	Ft.	Ins.	Ft.	Ins.
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Mr. Hodgson's male over

all is.....	5	11½	Mr Bligh's	5
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Do. to base of horns,	1	0	do.	1
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Do. basal circumference,	1	3½	do.	1
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Mr. Hodgson's female

over all,.....	5	6¼	do.	5
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Do. to base of horns,	0	11	do.	9
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Do. basal circumference,	0	8	do.	0
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*Ovis Ammonoides*, Hodgson, was dedicated to Mr. Hodgson as *Ovis Hodgsonii*, some time before the publication of the name *ammonoides* in the 'Proceedings of the Zoological Society' for July 1840. On the same occasion, Mr. Blyth pointed out that Captain Hutton's *Ovis cycloceros* had been priorly named by him *Ovis Vignei*.

*Ovis Ammon*, Pallas; *Ovis montana*, Desmarest; *Ovis nivicola*, Eschscholtz. is distinct from *Ovis montana* of North America and Mr. Blyth refers to it, though with considerable hesitation, the horn in the Museum of the Royal College of Surgeons, London, (vide Taylor's plate, figs. 3 and 4,) for which was suggested the provisional name *sculptorum*.

(2136) OVIS POLII, Blyth. Founded on a magnificent frontlet and horns brought by Lieutenant Wood from the Pamir steppe; combined with the notice quoted from Marco Polo, which refers undeniably to the same animal. Of the distinctness of this superb species, there can be no doubt whatever; and the frontlet is figured in Taylor's plate, figs. 1 and 2.

(2137) OVIS CALIFORNIANA, Douglas. Description cited from 'Zoological Journal;' and the horns fully described by Mr Bligh, and figured in Taylor's plate, fig. 5. An unquestionable species.

(2138) OVIS NAHOOR, Hodgson. Described from specimens, amongst which was a hornless female; and first clearly established as distinct from *O ammon*. †\*

(2139) OVIS BURRHIEL, Blyth. Described from a fine male; and the horn of a still older one. It would seem, however, that Mr. Blyth was wrong in assigning to it a loftier altitude of haunt than that of *O. nahoor*. Capt. Smith has informed him that *O. burrrhel* and *O. nahoor* keep always in separate flocks, and are never seen on the same feeding ground; the Burrhel seldom ascending above 16,000 feet elevation, while the Nahoor goes much higher: Both bleat like domestic sheep. Near the Boorenda Pass, the Burrhel is much more plentiful than the Nahoor; but the latter is far more extensively diffused over the Himalaya generally. At the close of summer, when the snow is nearly melted away, a very nutritious grass grows abundantly under a thin coating of snow, and both species become

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exceedingly fat by feeding upon it, i. e. in the months of August, September, and October. At this time they can only be compared to the prize animals exhibited at the Smithfield shows, and they run with considerable difficulty, though still being far from easy of approach. In winter, when snowed in, they actually browse the hair off each other's bellies, many together having retired under the shelter of some overhanging rocks, from which they come out wretchedly poor. They produce one or two young, (commonly two,) in June and July. In Taylor's plate, the representations of the horns of these two species were unluckily transported; No. 6 referring to *O. burrrhel*, and No. 7 to *O. nahoor*.

*Ovis Burrhel* is deficient in the suborbital sinuses, and the same deficiency occurs in *Ovis Nahoor*.—*Beng. As. Soc. Jour.* No. CLXXVI. April, 1847.

(2140) OVIS CYLINDRICORNIS, Blyth. This is the least satisfactorily established of all the species in Mr. Bligh's monograph: it resting on a communication from Col. Hamilton Smith, relative to a species which must have been very different from either of those known to Mr. Blyth though described from memory only by Col. H. Smith (one of the most experienced of Zoologists in the history of the *Ruminantia*.)

(2141) OVIS GMELINI, Blyth. Described from very fine specimens of the male, female, and young; and identified with a species long ago rudely figured by the younger Gmelin, and the horn by Pallas; and Gmelin's description of the habits quoted, with further original information. Head figured in Taylor's plate, No. 9.

(2142) OVIS VIGNEI, Blyth. Described from a coloured figure taken from life, and from two pairs of horns, the distinctness of which from those of all the other species is most obvious: vide Taylor's plate, fig. 9. A skin of this animal was described by Pennant as the "Bearded sheep," but was confounded by him with *O. tragelaphus* (vide X, 877); and there is a brief notice and very passible figure of the species, taken from an animal killed in the vicinity of Persepolis, in Lieutenant Alexander's 'Travels from India to England,' &c. (1827.) It again appears as the "Wild sheep of the Hindu Koosh," described by Capt. Hay, J. A. S. IX, 440; and as *Ovis cycloceros*, Hutton, 'Calcutta Journal of Natural History' II, 514, and pl. XII, being again noticed by the latter gentleman in J. A. S. XV, 152. It may be observed that Capt. Hay remarks this species to differ from *O. tragelaphus* "in having a lachrymary sinus; and Capt. Hutton also described "a moderate-sized lachrymal sinus, which appears to secrete, or at all events contains, a thick gummy substance, of good consistency, and of a dull greyish colour. The Afghan and Belooch hunters," he adds, "more especially the latter, make



use of this gum, by spreading it over the pans of their matchlocks, to prevent the damp from injuring the priming." We may, therefore, rest satisfied of its existence in this species, which is nevertheless most closely allied to the next.

(2143) *OVIS MUSIMON*, L. Described by Mr. Blyth from life, and a further notice given in J. A. S. X, 878. "The Argalis and Moufflons (not to mention the *Tragelaphi*)," writes Mr. Hodgson, "seem to form two striking groups among the wild Sheep: Our Nahoor is a complete Moufflon; hence asks Mr. Bligh if the Corsican animal is, like the Himalayan, devoid of suborbital sinuses." In reply to this the Prince of Canino states that it is so devoid; but Mr. Hodgson is mistaken in approximating the Nahoor and Burrhel to the Moufflon of Corsica. These two Himalayan species, instead of being "complete Moufflons," are (so far at least as their horns are concerned) unlike *O. musimon* and form a little group *per se*, unless *Ovis cylindricornis* should prove to range with them; and the Moufflon is quite excluded from his definition of "round-horned" sheep, for which group Mr. Blyth presumes the appellation *Pseudois* is proposed. Their being "furnished with a well developed tail," will not exclude the Californian Argali, the tail of which is described as "eighteen inches long!" Mr. Ogilby long ago remarked the absence of suborbital sinuses in *Ovis nahoor*; and the group formed by *Ovis nahoor* and *Ovis burrhel* was distinct-

ly indicated in Mr. Bligh's monograph (vide J. A. S., X, 867), being estimated there, as he still thinks, at its true value.

Should it prove that *O. musimon* is really devoid of the facial cavities, the value of this character would fall to a mere specific distinction; for however the wild sheep may be arranged into minor groups, the *O. Vignei* (which has the sinuses) could scarcely be placed in a different subdivision from *O. musimon*. And to the same group must be referred *O. Gmelini* and *O. ophion*, though altogether perhaps forming a subsection of it. Both in *O. Gmelini* and *O. Vignei*, we find indications of affinity with the African *O. tragelaphus*.

(2144) *OVIS OPHION*, Bligh. Founded on the coloured figure and description, by M. M. Brandt and Katzeburgh, of a specimen in the Berlin Museum.

(2145) *OVIS ARIES*, L. The domestic sheep. Several wild types, as is still strongly suspected: but none of those above enumerated; unless, to a partial extent, *O. Vignei*, though even this very doubtful.

(2146) *OVIS IXALUS PROBATON*, Ogilby. Described from a hornless specimen, which is at least closely allied to

(2147) *OVIS TRAGELAPHUS*, Pallas. A well known species. Described from specimens, observed both alive and in museums.—*Ben. As. Soc. Journ. April 1847.*

## P.

(2148) *PADRI*, the Tamil and Malayala name of a tree *Bignonia chelonoides*, which is about twenty feet long and eight inches in diameter; it produces a small white flower in shape like the fusca, or rather the snow-drop, which has a most powerful fragrance, they are prescribed in infusion as a cooling drink in fevers. The leaves, if steeped in a portion of lime-juice, make a most grateful and cooling drink. This is one of the sacred trees, and considered the property of the pagoda; and the flowers are held sacred for the purpose of decorating the dancing-girls' heads on days of ceremony.—*Edye M. S. C.*

(2149) *PALMYRA* OR *TADMOR* (pronounced by the Arabs Toodmor), both signifying the place of Palm trees, is first mentioned as having been built by Solomon. From that time till after the captivity of the Roman Emperor Valerian by the Persians but little is known of it. It rose to the highest opulence and splendour under Odenatus, whose dominions extended from the Euphrates to the Mediterranean. But its chief interest is connected with the wife of Odenatus, Zenobia Queen of the East.

The increasing power attracted the notice and jealousy of Aurelian who having defeated her in two pitched battles, laid siege to Palmyra. Soon after the surrender of the city, the Palmyrenes revolted against the Emperor, who in consequence entirely destroyed the city, and put the greater part of the inhabitants to death. He afterwards restored the temple of the Sun, and gave permission to the remnants of the Palmyrenes to rebuild and inhabit their city. The pile of building on the left is the temple of the sun, consisting of an immense court, of which the ruins are spread over a space of 220 yards. It is surrounded by a stately wall, adorned with pilasters within and without. Two rows of marble columns, of which about sixty remain entire, formed a colonnade within the court, which is now occupied by the Arab huts. The great colonnade which forms the principal feature in the drawing, extends more than half a mile in length, and probably was the main street in the city, from which others branched out laterally; it was entered by an archway, and terminated by a large building, of which the portico

# PALÆORNIS VIRIDIMYSTAS.

alone remains. Innumerable columns and ruins of temples, are scattered over the plain. Its peculiar interest is not confined merely to architectural details, but to its position in the desert, and its utter loneliness. I may quote the sentiments of Lord Lindsay who writes thus :—

“An awful stillness,—a lifelessness pervades the ruins,—they stand as lonely and silent as when the last of the Palmyrenes departed and left the city of Zenobia to silence and decay.”

(2150) PALA MARAM, the Malayala name of one of the jungle fruit trees. It produces a fruit which the natives use medicinally, but as timber it is of no value.—*Edye, Mal. & Can.*

(2151) PALAWAN. The south western-most island of the Philippine group, is a long narrow strip of land extending nearly south west and north east 250 miles, forming the eastern boundary of the China Sea, from latitude 8°. 13' to 11° 17' N. The northern extremity is a narrow peninsula about 60 miles in length, consisting of a mass of limestone rock, rising precipitously from the sea to 200 to 300 feet in height, which the native inhabitants climb readily in search of edible birds nests, their chief occupation. It is along the eastern coast of the island that ships proceed when ships are bound up the China Sea late in the seasons, when the north east monsoon is expected, and derives from this the name of the Palawan passage.—*Journ. Ind. Arch.*

(2152) PALLAGA PAYANYE, the Malayala name of a tree, which means “plank-wood.” It grows to about twelve inches in diameter, and fourteen feet in height. It is soft and light, and is used by the natives for county vessels and catamarans. This wood, with all the light jungle-woods, are of little value, in consequence of their early and rapid decay.—*Edye. M. and C.*

(2153) PALMA BRAVA, Nibong, Tagala of Mindoro, used by the wild tribes of Mindoro to form their bows and point their arrows.

(3154) PALÆORNIS VIRIDIMYSTAS, Blyth. Size about that of *P. malaccensis*; closed wing 6 in. Colour bright golden green, the green deeper than usual in this genus with light indigo-blue on the primaries and tail, axillaries, and fore-part of the wing underneath bright yellow a broad band of peach-blossom red below the eye from bill to middle and lower portion of ear-coverts, rest of the latter green tinged with verditer monstachial streak as in *P. malaccensis* and others, but of a darkish green hue contrasting with the more yellowish green of the body: a slight pale duskyish streak also from nostril to eye and small red spot above the eye (conspicuous in the living bird). Bill duskish in the individual but with the upper mandible doubtless coral-red in the adult Irides dark greenish-hazel, surrounded by a white ring. Feet pale greenish-gray. Habitat unknown.—*Journal of the Asiatic Society of Bengal, p. 445.*

# PAPUANS.

## (2155) PANDANUS ODORATISSIMUS.

Sweet scented pandanus,	Keder, ARABIAN.
ENG.	Guli Kivea Kavondi.
Pandan odoriferante,	PERS.
FR.	Keora Indian and Cash-
Pandanus, wohlriech,	mir, HONIBERGER.
GER.	
Kheura, HIND.	Kaldera Bush, ENG.
Armack, „	Ketgu, HIND.
Kasi, „	

The terminal buds, and a portion of the leaves, their white base, are edible.

## (2156) PANDION HALLÆTUS, the osprey.

Soon as the sun, great ruler of the year,  
Bends to our northern climes his bright career,  
And from the caves of ocean calls from sleep,  
The finny shoals and myriads of the deep;  
When freezing tempests back to Greenland ride,  
And day and night the equal hours divide;  
True to the season, o'er our sea-beat shore,  
The sailing osprey high is seen to soar,  
With broad unmoving wing; and circling slow,  
Marks each loose straggler in the deep below;  
Sweeps down like lightning! plunges with a roar!  
And bears his struggling victim to the shore.  
The long housed fisherman beholds with joy,  
The well-known signals of his rough employ,  
And as he bears his net and oars along,  
Thus hails the welcome season with a song.

## THE FISHERMAN'S HYMN.

The osprey sails above the sound,  
The geese are gone, the gulls are flying;  
The herring shoals swarm thick around,  
The nets are launched, the boats are plying;  
Yo ho, my hearts! let's seek the deep,  
Raise high the song, and cheerily wish her,  
Still as the bending net we sweep,  
“God bless the fish-hawk and the fisher!”  
She brings us fish,—she brings us spring,  
Good times, fair weather, warmth, and plenty,  
Fine stores of chad, trout, herring, ling,  
Sheepshead, and drum, and old wives' dainty,  
Yo ho, my hearts! &c.

She rears her young on yonder tree,  
She leaves her faithful mate to mind 'em;  
Like us, for fish, she sails to sea,  
• And plunging shows us where to find 'em,  
Yo ho, my hearts! &c.—*Wilson, p. 83.*

(2157) PANGLIMA GAJAH, MALAY. The first word means a governor, or superintendent, and the other elephants. The office of superintendent of elephants at a Malayan court was one of considerable dignity.—*Journ. Ind. Arch.*

(2158) PAPUANS, or oriental negroes exist in the interior of New Guinea, where they are called by Mr. Muller *Mairassies*, and by Lieutenant Modera *Alfoeren* or *Alfoers*. The Papuan race extends from New Guinea eastward through



the Louisiade and Solomon Archipelagos to the New Hebrides where it co-exists with some tribes of Malaya-Polynesians, and still further to the Fiji islands which however are the extreme limit of the race in an Eastern direction. The Fijians are the aristocracy of their race. In a South direction the Papuans have evidently spread far and wide over the continent of Australia and occur even in Van Diemen's land, though their characteristics are greatly modified.

Writing on the leading characteristics of the Papuan Australian, and Malaya Polynesian nations Mr. G. Windsor Earl, M. R. A. S. says that the existence of a Negro race in the Indian Archipelago, so remote from the continent which is considered as the original seat of the race, has given rise to endless speculations as to how they get there, and probably will continue so to do until the end of time, for being a nation without a written language, and surrounded by others whose records are carried back to no very distant date, and whose traditions have become, from lapse of time, mere fables, this point can only rest upon circumstantial evidence, and therefore will ever prove liable to dispute. Their position in many of the larger islands as occupants solely of the mountain fastnesses, surrounded by people who evidently belong to a distinct race, has certainly put an end to those theories of the last century which attributed their origin to the shipwrecked crews of Arabian slave-vessels, and has led to a very general opinion that they were, in fact, the aboriginal inhabitants of the countries in which they are found. That their existence was not altogether unknown to the ancients is proved by the maps and writings of Ptolemy, the Alexandrian, who flourished soon after the commencement of the Christian era, and was the first to reduce geography to a system. In the last map of his volume, that which contains the "Aurea Chersonesus" and the "Iabades Insulæ," (supposed to have meant respectively the Malayan Peninsula or Sumatra and the Java Islands) he places a country far to the eastward of the Aurea Chersonesia, under the equinoctial line, which he states to be occupied by "Æthiopes Ichthyophagi," or "Negro fish-eaters;" the first term being that employed by the Romans to distinguish the black and woolly haired Africans from the Mauritanians and other brown races of the east; and the second, that usually applied to all nations who derived a portion of their subsistence from the sea.

The system of naming nations from the food which formed their chief means of support, seems to have been very prevalent among the ancients; witness "Hippophagi" the horse eating Tartars, "Lotophagi," Lotuseaters, &c. This system, although not to be recommended at the present day, has proved highly useful, for these names are sometimes found to contain the only existing

description of the habits of the people on whom they were conferred, as in the present instance. Dr Leichhardt in his late overland journey from Sydney to port Essington, found some tribes of genuine Lotophagi on the lagoons of the table land, as will come to be noticed below.

The position of this country with regard to the Aurea Chersonesus agrees well with that of New Guinea, the great seat of the Papuan race. The existence of a negro people, at so remote a spot, which he must have learned from the information of Indian navigators, seems, indeed, to have led Ptolemy into the great error of his system, for believing that the country of the "Æthiopes Ichthyophagi" formed part of the continent of Asia, he has made that continent, in his general map of the world, come round by the south and join the African continent about Point Prassum, in latitude 15° S. (the then southern known limit of the east coast of Africa), thus making the Indian Ocean and the seas of the Eastern Archipelago, form one vast Inland sea.

The most striking peculiarity of the Oriental negroes consists in their frizzled or woolly hair. This, however, does not spread over the surface of the head as is usual with the negroes of western Africa, but grows in small tufts, the hairs which form each tuft keeping separate from the rest, and twisting round each other, until, if allowed to grow, they form a spiral ringlet. Many of the tribes, especially those who occupy the interior parts of islands whose coasts are occupied by more civilized races from whom cutting instruments can be obtained, keep the hair closely cropped. The tufts then assume the form of little knobs, about the size of a large pea, giving the head a very singular appearance, which has, not inaptly, been compared with that of an old worn-out shoebrush. Others again, more especially the natives of the south east of New Guinea, and the islands of Torres straits, troubled with such an obstinate description of hair, yet admiring the ringlets as a head dress, cut them off and twist them into skull caps made of matting, thus forming very compact wigs. But it is among the natives of the north east of New Guinea, and of some of the adjacent islands of the Pacific, that the hair receives the greatest attention. These open out the ringlets by means of a bamboo comb, shaped like an eelspear, with numerous prongs spreading out laterally, which operation produces an enormous bushy head of hair which has procured them the name of "Mop-headed Papuans." Among the natives of the Feejee islands, (the easternmost limit of the Oriental negro race) the operation of dressing the hair, occupies the greater part of a day.

The hair of the beards and whiskers, which generally grows very thick and bushy, is arranged in little tufts similar to those of the head, and the same peculiarity is found to exist in the hair with which the breasts and shoulders of the

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men are often covered, but the tufts are here farther apart than on the head and chin.

This woolly or twisted hair is peculiar to the full blooded Papuans. A comparatively slight mixture with the brown-complexioned or Malayu Polynesian race appears to destroy the peculiarity. The hair of people of mixed race covers the surface of the head, or at least has done so in all cases that have come under my observation, and is sometimes only slightly curled. It is therefore very easy to distinguish the pure Papuans, and throughout this essay those only will be called by that name who possess this their leading characteristic.

The term Papuan is derived from a Malayan word "Papua or Prana Pua," crisp haired. The term "Tanna Papua" or "Land of the crisp-haired" is applied by them not only to New Guinea, but to all the adjacent islands which are occupied exclusively by this race. It is peculiarly applicable, and comprehensive, and so entitled to respect as having been conferred by a people who must have known them for ages before we even heard of their existence, that I trust the ethnologists of Europe will excuse me for retaining it in preference to the newly invented term "Melanesian" or "inhabitants of the black islands," which, although applicable enough to the Papuans, is equally applicable to the greater portion of the Australian tribes. The celebrated philologist, Marsden, has adopted the term "Negrito" or "little Negro" from the Spaniards of the Philippines, and has applied it to the entire race.

The features of the Papuans have a decidedly negro character; broad, flat, noses; thick lips; receding foreheads and chins; and that turbid colour of what should be the white of the eye which gives to the countenance a peculiar sinister expression. Their complexion is universally a deep chocolate colour, sometimes closely approaching to black, but certainly a few shades lighter than the deep black that is often met with among the negro tribes of Africa.

With regard to stature, a great difference is found to exist between various tribes, even in New Guinea, and which has led to much confusion in the descriptions given by travellers, who have, perhaps, each only seen a single tribe. On the south-west coast of New Guinea, within a space of one hundred miles, are to be found tribes whose stature is almost gigantic, and others whose proportions are so diminutive as almost to entitle them to the appellation of pigmies, while the manners and customs of each so exactly correspond as to preclude the supposition that these peculiarities can be other than accidental. It is difficult to account for these peculiarities, but as the stout and stalwart Papuans are met with only among those coast tribes who have maintained their independence, and at the same time have acquired many of the

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agricultural and mechanical arts from their neighbours the Malayu Polynesians while the pigmies are found only in spots where they have been driven to the mountain fastnesses, or have fallen under the influence of other races, we may conclude that their mode of life has much to do with this difference in point of stature and proportions.

With regard to form, the various tribes of Papuans differ as much as in stature. The more diminutive tribes, whose members chiefly come under the notice of Europeans from their existing in great numbers as slaves throughout the Moluccas are unprepossessing enough in appearance when in their natural state, but when under good masters, the regularity and wholesome nature of their diet, coupled with their apparent utter forgetfulness of their native land, produce a roundness in their neat clean limbs, and a sprightliness of action which is rarely met with among their more civilized neighbours the Malayu Polynesians. On the other hand the large Papuans are more remarkable for their strength than their symmetry. They have broad shoulders and deep chests, but a deficiency is generally found about the lower extremities, the splay feet and curved shins of the western Africans being equally, or even more common among, whom I may be allowed to term, the gigantic Papuans.

With regard to the general disposition of the Papuans, a great difference is found between those living in a state of independence, and those who exist in bondage among the neighbouring nations. The former are invariably found to be treacherous and revengeful, and even those who have long been accustomed to intercourse with strangers, the tribes of the North West coast of New Guinea, for example, are never to be depended upon, and the greatest precautions are always taken by those who visit them for purposes of trade. The wilder tribes generally avoid intercourse with strangers, if the force which lands is sufficiently great to cause alarm, but if otherwise they pretend friendship until an opportunity occurs, when they make a sudden and ferocious attack. But what distinguishes them most from their neighbours the Malayu-Polynesians, and even from the Australians, is the unextinguishable hatred they bear towards those who attempt to settle in their territory, and which is continued as long as a man of the tribe exists. It is, probably, this perfectly untameable nature that has led to their utter extermination in all those islands of the Indian Archipelago that did not possess mountain fastnesses to which they could retire to lead a life similar to that of the Boschmen of South Africa. We have had recent instances of this in Van Dieman's Land, Melville Island (N. W. coast of Australia) and at Fort Du Bus on the west coast of New Guinea, in all which settlements the



country was occupied by a pure or nearly pure Papuan race. In the former, hostility was continued as long a native remained on the island, and in the two last until the settlements were abandoned in despair. On the other hand, their neighbours, the Australians, have invariably submitted after a single trial of strength, while the Malayu-Polynesians, when not under the influence of other foreigners, have always evinced a desire to have strangers, especially Europeans, settled among them, as shewn by the people of the Moluccas when first visited by the Portuguese, and as displayed at the present time in those remote parts of the Indian Archipelago where the race maintains its ancient purity.

The untameable ferocity of the Papuans only exists as long as they remain in their native country. On leaving it their character seems totally changed, as far as regards this particular. The Papuan slaves who exist in great numbers in the eastern parts of the Archipelago are remarkable for their cheerful disposition and industrious habits, and nothing could exceed the orderly conduct of the remnant of the Van Dieman's Land natives after they had been hunted down, and removed to an island in Bass' Strait.

Before proceeding to describe the localities in which the Papuan race is now found, I think it proper to allude to certain of their customs which distinguish them from the Malayu-Polynesians, and which certainly are of Papuan, or at least of Negro, origin. One of these is the custom of raising the skin in cicatrices over various parts of the body, especially on the shoulders, breast, buttocks, and thighs. This must not be confounded with the tatooing or puncturing the skin which is practised by many of the Malayu Polynesian tribes, and which is never met with among the Papuans, as the scarifications which I am about to describe are unknown to the others. The skin is cut through with some sharp instrument in longitudinal stripes, and, if on the shoulder or breast, white clay, or some other substance, is rubbed into the wound, which causes the flesh below to rise, and these scarifications, when allowed to heal, assume the form of raised cicatrices, often as large as the finger. The process by which these cicatrices are produced and which I have had opportunities of watching in their progress from day to day until duly formed, is perfectly inexplicable to an European, who would be thrown into a fever by any one of the wounds which these strange people bear, two or three at a time, without complaining, but certainly not without suffering. It is, however, quite evident that the Papuans, and also the Australians, as will be mentioned below, possess a callousness of skin, or insensibility of pain, which is quite unknown among more civilized races.

Boring the septum of the nose is universally practised among the Papuans. In the first instance they wear a roll of plantain leaf in the

orifice which by its elasticity enlarges it to a sufficient size to admit the thigh bone of a large bird, or some other ornament, which is then worn extending across the face on all great occasions. Our sailors have a very quaint name for this practice, which often comes under their observation among the Papuan islands of the Pacific; they call it "sprit-sail yarding," after a cruel method they have of treating sharks and dog fish, which are frequently let go after having been hooked, a piece of wood being previously thrust through their nostrils, which projecting on either side, prevents them from getting their heads under water, and they die a lingering and painful death. I have never met with, or heard of, this practice of boring the nose among people of the Malayu-Polynesian race, and I may say the same with regard to the scarifications mentioned above. The latter, or rather those among them who are sufficiently barbarous to resort to personal disfigurement, seem to have adopted tatooing and boring the ears in lieu of the more coarse and painful ornamental work of the Papuans.

Filing or grinding down the front teeth until they become pointed is practiced by some of the tribes of New Guinea and of the adjacent islands of the Pacific. This custom however, is not confined exclusively to the Papuans, as it is practised also at the Pagi islands, on the west coast of Sumatra, the natives of which appear to be Malayu-Polynesians. This custom must not be confounded with one which is common among many of the Malayan and Bugis tribes, that of grinding down the front teeth until they become almost level with the gum.

Another singular custom which is only met with among the Papuans, or the tribes closely bordering on them, is that of dyeing the hair (which is naturally black) a reddish or flaxen colour, by using applications of burnt coral and sea-water in some instances, and preparations of wood ashes in others. This process seems to expel all the dark colour from the hair, leaving it of a flaxen tinge which appears to bear a close resemblance to the celebrated "*capillus flavus*" so much admired among the Roman ladies and which seems to have been produced by a similar process. The only Malayu-Polynesians that I have known to practice this custom are some of the natives of Timor Laut, Sermatten, and Baba, islands lying to the westward of New Guinea and not very remote. I am therefore induced to consider it as a Papuan, or rather, perhaps, as a "Negro" custom, for it is equally prevalent in many parts of Africa, especially among the Somalis, and other tribes in their neighbourhood. Travellers who have had opportunities of visiting our post at Aden in the course of their voyages between Europe and India by the overland route, may have observed this custom among the African coolies employed in coaling the steamer, who

sometimes appear with the plaster of coral still attached to their heads.

The Papuans, for the most part, exist only in a savage state, deriving a scanty substance from the productions of nature, living in conical shaped huts; or where they appear as occupants of the sea coast, roaming about in small canoes in search of food. Some of the more independent tribes, by which I mean those who have exclusive possession of the country they inhabit, have, however, adopted many improvements. In several parts of the north and of the south coasts of New Guinea, the villages consist of one large house, erected on piles, and occupied by all the married people, with a smaller one adjacent for the bachelors. These houses bear a very close resemblance to those of the Dyaks of Borneo, but are smaller and of more rough construction. Here the Papuans also cultivate fruits, yams, and sweet potatoes and keep hogs and poultry to kill for food, in fact are almost on a level, as far as regards agriculture, with the more uncivilized tribes of the Malayu-Polynesians, from whom, indeed, if we may judge from the names employed to designate their agricultural productions, they have derived this slight, but important advance they have made in civilization.

The weapons of the Papuans are heavy wooden clubs, spears or lances of nibong or other hard wood, and darts formed of a small kind of Bambu, provided with points of hard wood or of sharpened bone. The lances are projected generally by means of a becket of sennit about a foot and a half long, one end of which is provided with a toggle. This is held between the fingers, while the other end is fastened to the lance with what sailors call a "half-hitch" knot, which flies off when the lance is projected, thus allowing it to go free. The becket gives a greatly increased purchase to the thrower, but is much inferior in this respect to the womera or "throwing stick" of the Australians which will be described when we come to speak of that people. The darts are projected by means of a powerful bow, often six feet in length, with a bow-string of rattan. I suspect that this instrument was not originally Papuan, but has been adopted from the Polynesians. Stone axes, and knives of quartz are now superseded among all those tribes who have either direct or indirect communication with the traders of the Archipelago, by Parangs, or Chopping-knives of iron. Their agricultural instruments are mere stakes of wood, sharpened at one end, which proves sufficient to effect the rude interference with nature required by their mode of cultivation.

The art of navigation appears never to have been in a very advanced state among the Papuans, since their navigation has only extended to those countries which could be reached from the continent of Asia without entailing the necessity of going out of sight of land, nor are they

yet sufficiently advanced in the science of navigation to venture on any other than coasting voyages. Towards the eastern limits of the Papuan race, where they come in close contact, and are often mixed with the Polynesians, navigation is in a more advanced state than elsewhere, but this is evidently the result of contact with strangers, by whom, indeed the navigation is personally conducted.

The highest state of the art among the Papuans, without foreign assistance, is met with in Torres strait and upon the south coast of New Guinea. Here they possess large canoes of such construction and propelled in so peculiar a manner, that we must consider them purely Papuan. Some very excellent sketches of these canoes are given in Flinder's voyage, with so full a description that it will be unnecessary for me, to enter into minute particulars. These canoes or boats are from thirty to forty feet long, and the planks with which they are constructed are sewed together with the fibres of the cocoanut. Each is provided with an outrigger, and a platform of bamboo occupies the centre of the boat on a level with the gunwale. They are propelled in calm weather by paddles with long handles, the rowers all standing, as is generally the case among the Papuans. But the most striking peculiarity of these vessels consists in the sail, which is an oblong piece of matting set up in the fore parts of vessel by means of two poles or masts, to which the upper corners of the sail are fastened. These masts are moveable, and the sail is trimmed by shifting the head of one of the masts aft. According to my experience these boats sail very indifferently, except before the wind, but Captain Flinders, who had good opportunities of judging, maintains a more favourable opinion. They are often to be met with about the month of March three or four hundred miles down the North-East coast of Australia, the islanders being in the habit of making an annual voyage in this direction. The stopping places are usually the islands lying off the coast, where they obtained tortoise-shell and trepang, the chief objects of their voyages.

The natives of the south coast of New Guinea have very large canoes of a similar but more unwieldy construction, and propelled by a similar description of sail. These have never been seen far from the coast, and in fact are almost unmanageable from the difficulty experienced in steering such unwieldy masses with paddles alone. It is therefore difficult to conceive for what purpose they have been constructed, unless it should be for war, in which case their large size would give them an imposing appearance.

The New Guinea canoes generally are of light construction and are provided with an outrigger. The larger ones have an attap roof and are capable of containing an entire family, with household furniture and domestic animals.—*Journal*



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of the *Indian Archipelago*, 1849, page 682 to 689.

In a northwest direction from New Guinea, the Papuan race extends through the Moluccas, the Philippines and possibly to Borneo but in these islands they only appear in small and scattered tribes occupants of the mountain fastnesses.

The small islands which extend from New Guinea to Timor, with the exception of the Arru islands, are occupied by Malayu-Polynesians of the most decided character, but at Timor, especially near the north-east end, a race evidently of Papuan origin again appears, but never, as far as I have been able to ascertain after strict enquiry, in an absolutely pure state. These tribes are much oppressed by the Malayu-Polynesians who occupy the table land of the interior, and the slaves which are brought down to the settlements on the coast, and were formerly exported to Macao and other places, were chiefly of this race, which has led to very erroneous impressions with regard to the nature of the inhabitants of Timor on the part of those who have only met them at Macao, where the Negro character naturally prevails among them. Some tribes on the great island of Flores or Mangarai assume a more decided Papuan character, and there is said to be also a tribe of these people in the neighbourhood of the Timboro mountain on Sumbawa; but beyond this they disappear, and are not encountered again until we meet them on the Malayan Peninsula under the name of Semangs, occupying some mountain tracts in the states of Kidah, Perak, and Kalantan. The Andaman islands in the Bay of Bengal are occupied by a people of most decided Papuan character, who bear indeed, a very striking resemblance to the natives of Van Diemen's Land (Note C.) Hence they can be traced no further, unless the analogy recently discovered by Mr. Norris, the Assistant Secretary of the Royal Asiatic Society, between the Tamul language of the Coromandel coast and some of the Australian dialects may lead to the establishment of an affinity between the nations that use them. But this is a subject more peculiarly the province of Indian ethnologists, and they may probably find their labors lightened by having the leading characteristics of the Papuans and Australians more clearly defined.

Although the Andaman Islands lie in the direct track of ships navigating the eastern side of the Bay of Bengal, and were once actually occupied by a British establishment, the natives are scarcely better known now than they were during the earlier period of our intercourse with India. This is to be attributed to that feeling of hostility and aversion towards strangers which they possess in common with all the wilder Papuan tribes. Having learned by experience that they are utterly unfit to contend with the strangers who occasion-

## PARUS XANTHOGENYS.

ally visit or are thrown upon their shores, they usually, or, I may say, invariably, avoid all intercourse, and even the members of our establishments there only came into close contact with those individuals who had been taken captive in hostile encounters, or had been found in the woods or on the strand in a state of exhaustion from famine. A very full account of such particulars as could be acquired concerning them, will be found in one of the earlier volumes of the "*Asiatic Researches*," and also in Colonel Symes' Embassy to Ava. Their limbs are spare and ill proportioned, their bellies protuberant, the complexion black and the hair wooly. They have also a taste, so characteristic of the wilder Papuans, for daubing their heads with red ochre. They have canoes, but use small rafts when they wish to visit the islets. Both sexes go entirely naked, for the pieces of fringe that they wear about are rather intended for ornament than as a covering. They obtain fish by descending to the shore at low water and spearing those that are left among the reefs by the receding tide; or by catching them with small hand-nets, and depositing them in long wicker baskets which they carry slung from their shoulders. All these are characteristics of the wilder coast Papuans, especially those of Van Diemen's Land to whom indeed the Andamans bear a resemblance so striking as to excite surprise that two tribes who must have been separated during many ages, and who reside in climates so different, should be distinguished by precisely the same characteristics. The only point of difference that can be detected, consists in the knowledge on the part of the Andamans of the use of the bow and arrow, which was either never known to the Van Diemen's Land natives or has been neglected in favour of the dart or throwing spear, which is far better adapted to the open nature of their country. Many improbable stories, among others the usual one of wrecked slave vessels, have been invented to account for the singularity of a negro race existing on an island near the eastern shores of the Bay of Bengal, but at that time, it was not so generally known as it is at present how far and wide this race had spread over the remote East.—*Jour. Ind. Arch. January 1850, page 9.*

(2159) PARATY MARAM. Cotton tree; *Elæodendron*, the Tamil name of a tree. It grows to about twelve inches in diameter, and twelve feet long, and produces a nut which the natives eat, and on which wild animals feed. It is of not much value.—*Edye. M. & C.*

(2160) PARUS XANTHOGENYS of Dr. Jerdon's catalogue, for which Mr. Blyth proposes the name of *P. Jerdoni*. N. s. It much resembles *P. Xanthogenys*, Vigors, of the N. W. Himalaya; but is conspicuous by having the back less tinged with yellow, larger, portions of the plumage not so intense in hue, and the yellow sincipital streak is not continued forward

over the eye, as in *P. Xanthogenys* (verus). Length of wing 3 in; and of tail  $2\frac{3}{8}$  in; in *P. Xanthogenys* the wing varies from  $2\frac{1}{2}$  to  $2\frac{3}{4}$  in, and the tail measures  $2\frac{1}{8}$  in. This is the third species which has now been discriminated apart from *P. Xanthogenys*, Vigors; the others being *P. Spilonotus*, Blyth, from Nipal, Sikim, the Khasyas, &c., and *P. subviridis*, Tickell, Blyth, from the mountains.

He has further distinguished *P. Rubidiventris* of Nipal and Sikim from *P. Melanolophus*, Vigors, of the Simla and Masuri mountains; with which the *P. Melanolophus* of Jerdon's catalogue still requires to be critically compared.—*Beng. As. Soc. Vol. V*, 1856.

(2161) PATTI VAYNGU (which means dog-wood) the Malayala name of one of the inferior sorts of jungle-wood: it is considered of little use or value.—*Edye. M. & C.*

(2162) PAWANGS. The Rev. P. Favre, Apostolic Missionary of Malacca, mentions that the Pawangs are a class of men endowed with the power of performing the functions of priests, teachers, physicians, and sorcerers. Under any of these titles they have not much to do amongst the members of their own nation; many of them do not believe that the Pawangs have any supernatural powers as sorcerers or as priests, nor do they attribute any efficacy to the acts they perform under these two titles. The functions of priests amongst them consist only in performing some superstitious practices; since, as I have mentioned in another place, they have no true and real worship. But it is amongst the Malays that their skill is much in honor, and their persons objects both of veneration and of fear. The Malays are ridiculously superstitious on that point; they have a firm faith in the efficacy of the supplications of the Pawangs, and an extraordinary dread of their supposed supernatural power. The Malays imagine that they are endowed with the power of curing every kind of sickness, and of killing an enemy however distant he may be, by the force of spells; and with the gift of discovering mines and hidden treasures. It is not uncommon to see Malay men and women, at the sight of a Binua Pawang, throw themselves on the ground before him.—*Journ. Ind. Arch. Vol. III. No. 2 Feb. 1849, page 155.*

(2163) PEARLS. On the Natural and Artificial production of Pearls in China. By F. Hague, H. B. M. Consul at Ningpo. (*Read 17th December 1853.*)

Mankind had probably no sooner taken to the use of oysters as food than pearls were discovered and at no period could they be so rude as not to prize the beautiful animal gem: hence in the most ancient records which have come down to us we find the pearl enumerated amongst precious articles. In China, so early as twenty two and a half centuries before our era, pearls are enumerated as tribute or tax: and at a later

period they are mentioned in the Rh-ya (the most ancient of dictionaries compiled more than ten centuries before our era) as precious products of the western part of the empire. They are also mentioned as ornaments and as amulets against fire, &c. With their theory of the devil's power, the Chinese are never perplexed: concerning the nature of any object it is sufficient to state that they are the female essence of the male principle. It is but fair to add that when Western naturalists adhering to Pliny taught that the oyster produced pearls from the heavenly dew on which it fed, a Chinese writer plainly states that pearls are the result of discoriation in the shell. Fresh water pearls were first in use in China, but soon after the commencement of intercourse with the continent of the Indian ocean they doubtless got them from thence in greater abundance. It was very early that official intercourse first took place. The Emperor Wuh (140-86 B. C.) sent to the sea for the purchase of pearls. After the introduction of Buddhism and when intercourse with India became more common, pearls were also frequently referred to in Buddhist writings as "Moni pearls." From one of these Moni pearls, the product of a dragon's tail, sufficient light was emitted to a cockatrice. A strange but not incredible story is given (806 A. C.) of a pearl as large as a pear which retained its lustre only three years, the result doubtless of molecular changes. Amongst the pearls of note is one of Japan as large as a hen's egg of remarkable lustre by night; of another sent to court in the middle of the eight century of extraordinary brightness like that of the moon and of another three inches seven-tenths in circumference which, with several others was sent up from Fokien probably derived from Ceylon. A curious account is recorded of an embassy sent in 1023 A. C. from Shiloch-ayenthoh by the king of Chinlien by his ambassador named Puyah-toil and others with presents of a cap and sancer and of a quantity of true pearls: and thirty or forty years later tribute bearers again came from the same court and solicited that in their audience they might be permitted to follow the customs of their own country which was graciously accorded. On the day appointed the messenger appeared at the door of the audience chamber kneeling and holding a golden tray containing pearls and golden figures of the water lily and on approaching the throne they tossed the contents on the floor before the Emperor which the courtiers instantly swept up and divided. They are noted as the most deferential of people. They must have been from some country which then existed in India or Ceylon or thereabouts. Marco Polo also mentions pearls in his work on China. At what period the Chinese fishing for pearls commenced cannot be ascertained except perhaps by reference to local topographical works which it is very difficult, nay almost impossible,



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to obtain. One account represents pearls as being found on the coast generally south of Canton. No particulars are given except of the fishery in the department of Lien-chan in the extreme southern part of the empire in the Canton province (Kwantung). On the sea is an island on which there is a pool or lake which the district magistrate annually visits to receive the tribute; personally inspecting the operation: The pearl fishers dive into the lake for pearls. The old shells are opened for pearls. The bottom of this lake is supposed to communicate with the sea—unfathomable in the centre—the crater probably of an extinct volcano; pearls as large as beans sometimes an inch in circumference have been found. The young shells are strung on a bamboo stick and dried in the sun mixed with cassia: then roasted in some medicinal production: they contain pearls as large as millet, thus the womb of the shell is the flesh, either of the large or small kinds. Another account names the district in Lien-chan where the pearl fisheries are conducted. In the sea there is an island with a lake into which the barbarous natives dive for shells: some years they are abundant and in others scarce. There is a myth amongst the fisher-men, of a walled city at the bottom guarded by monsters containing pearls of large size and splendour but which cannot be obtained for fear of the guards; small ones growing outside the city walls like grass being the only ones obtainable. Another writer says, South east of the Too city there is a smooth river with a sea (an island with a lake), Yuenmei river, containing large oysters having pearls. Visited by moonlight fishermen descend into the waters with a basket fastened to their waists: when they can hold their breath no longer they give a signal to be brought up. Voracious fish sometimes attack the divers when the rope floats upwards. Yung-tai-kei when at Canton appointed a Pearl Inspector. The fishers would collect several baskets of sea plants something similar to the willow which they detached from the rocks under water and brought them to the office. On the middle of these bushes were shells which contained pearls. Another writer says the rude sea people at Canton dive for pearl shells and cut them out; they leave their sea vessels in which they live and take to boats and then with a rope about the waist descend into the water; when they require breath they make a signal and are aided up. It is stated that between 1403-25, in consequence of so many of the divers being devoured by the sand fish (shark) or nothing left but their limbs, the fishers contrived an iron rake for gathering shells without diving, but they got a few only. Afterwards they contrived the method now pursued of a dredged or a scoop-like implement one on each side of the boat which as the boats sailed along gathered the shells. The above remarks are gathered

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from old native authors, but it is not likely that the pearl fishery exists at present at all in China, the places being exhausted as many others have been elsewhere. Were they now in existence they could hardly have escaped the notice of foreigners resident at Canton. These ingenious people were the first to devise methods to imitate the pearl. There is a note that at the commencement of the seventh century pearls were made of a composition of medicine. The art may have been lost or it may be the same as that now employed at and which originated at Canton and which appears to resemble that pursued by the French, who however have carried the art to a very much superior degree of perfection. Feeling much interest as to the method pursued by the Chinese with the Muscle Pearl in the winter of 1851-52 (in conjunction with a friend, Dr. McGowan, an American Physician resident at Ningpo by whose assistance he has been enabled to put together the preceding data, the writer dispatched an intelligent native to Hoochow in the adjacent province about three days journey from Ningpo, where the manufacture of artificial pearls &c. by means of the muscle fish is carried on to a great extent, and he succeeded in obtaining shells shewing the process during the different stages and also some live fish the first ever seen by foreigners. The fish are collected together in April or May and are opened principally by children who put a small bit of bamboo in the orifice: the elders then insert whatever they wish. The foreign substance made use of is composed of brass, bone, pieces of round pebble or mud. When the latter is used it is first well powdered, after which the pitch or juice of a tree is mixed with it to give it solidity. These are put indiscriminately into the fish and require nothing to keep them where they are placed, indeed it would appear that the fish have no power of themselves to reject anything which may be placed in them. After the fish have been operated upon, three spoonfuls of the scales of a fish, well powdered and mixed with water, are put into the smaller ones and five spoonfuls into the larger ones, the pieces of bamboo are then withdrawn and the fish are placed carefully in the ponds at a few inches apart. Some of the ponds being small will hold only about 5000 fish but the larger ponds contain a far greater number. The water in the ponds does not require to be deeper than from three to five feet and in dry seasons water is occasionally worked with them from the canals which intersect the country in every direction for the irrigation of the land. Four or five times each year the ponds are well manured with night soil. The fish are generally taken out of the ponds after ten months, but if allowed to remain a longer time they come to greater perfection, three years being considered the maximum time. Several millions of these

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shells annually find a market at Hoochow: the price varies considerably, some being worth about a penny the pair while others readily fetch eight pence the pair. The greater portion of the shells are sold to the dealers as they are taken out of the ponds but the Hoochow people prepare some few themselves and the price of each pearl or image ready for use is from one farthing to four pence. The shell is cut through with a fine saw as close to the pearl as possible the bit of shell which remains attached to the pearl is then removed as well as the brass bone or whatever may be inside of it, white wax being substituted and at the extremity a piece of the shell is again placed so as to render the pearl as perfect as possible. There are only a very few pearls of the best description which no doubt arises from the haste in which the Chinese force them upon the market. It is several years since the attention of foreigners at Ningpo was first drawn to the muscle Pearl and previous to the discovery, I as well as others imagined the articles resembling pearls which the wealthy natives wear so prominently on their caps were real and valuable gems. The production of the artificial pearls is quite a trade in the neighbourhood of Hoochow whole villages being engaged in it: indeed it is stated that some 5000 people find a livelihood by these means. The process was first discovered by Ye-jin yang a native of Hoochow. A. D. 1200. 1300. At his death, a large temple was erected to his memory at a place called Seaou-shang about twenty six miles distant from Hoochow. This temple is still kept up and plays are performed there every year to Ye's honor. A book is extant which contains every particular connected with this interesting subject but it could not be purchased. Mention of the art is made in the book of the district and of its producing an important article of commerce. The trade is a monopoly amongst a certain number of villages and families and any other village or family commencing it is required to pay for some plays at Ye's temple and likewise to subscribe something towards the repair of the temple. The Chinese in the south of Canton, also manufacture artificial pearls: the two provinces it is stated having exchanged their secrets many years ago, but the Hoochow people do not succeed very well with the Canton process, and there must be some very great peculiarity in either the climate or fish as it does not appear that the Canton people who are so noted for their perseverance with anything by which they can earn even a trifle have ever succeeded with the Hoochow method. From the circumstance of the trading junks both from the northern and southern provinces buying up all they can meet with in the shops at Ningpo, it would seem as though Hoochow was the only place in China where this trade is pursued.—*Journal of the Royal Asiatic Society of Great Britain and Ireland, Vol. XVI. Part 11, page 280.*

## PERSIAN GULF.

(2164) PEER-I-DUSTAGHEER SAHIB, a Mahomedan Wulee or saint whose tomb is at Baghddad. He is considered the chief of their saints.—*Herk.*

(2165) PEGU. Major Phayre, in July 1856, set down the following as the area and population of the British Province of Pegu.

District.	Area, Sq. M.	Population.
Rangoon. ...	9,800	137,130
Bassein. ...	8,900	128,189
Prome. ...	5,500	70,000
Henzada. ...	2,200	103,775
Toungoo. ...	3,950	34,957
Tharawadee ...	1,950	66,129
Total. ...	32,300	540,180

(2166) PELICANUS INFLATIFRONS. Blyth. A remarkable species of Pelican, was lately living in the menagerie of the Maharaja of Burdwan, in company with specimens of *P. Javanicus* and *P. Crispus*. It is generally similar to *P. Javanicus*, but has the frontal skin curiously inflated, so as to present somewhat the appearance of a largely developed frontal knob of *Anser Cygnoides* only feathered; and a further difference consists in the naked skin of the cheeks and pouch being yellowish-white, whereas in *P. Javanicus* that of the cheeks is deep purplish or livid carneous and of the pouch intense yellow. Mr. Blyth states, if distinct and new, *P. Inflatifrons*. Blyth,—*Jour. B. As. Soc. Nov. 1856.*

(2167) PENARU PALAM MARAM, the Malayala name of a tree. It is used at times by the natives, but is of little value.—*Edye M. and C.*

(2168) PERJI, the Malayala name of a tree which grows to about twelve feet in height, and ten inches in diameter. It is very hard and strong, and is used by the natives for knee and boat timbers; and is ranked among the jungle-woods of the coast.—*Edye M. and C.*

(2169) PERRA MARAM in Malaya, Coia Marm in Tamil, are names of the tree *Psidium Pyriferum* that produces the guava fruit. Its wood is very hard and close grained. This tree grows to about twelve or eighteen feet high, and eight inches in diameter; it is used, in conjunction with the jungle-woods, for inferior purposes, but is generally known as a garden fruit-tree.—*Edye. M. and C.*

(2170) PERSIAN GULF. There are but two winds which prevail in the Persian Gulf, the north-west and south-east, and when the latter sets in, the whole force of the sea is brought to bear directly against the current of the Euphrates, and hence an enormous deposit is effected of the aluvium brought down by the stream, thus barring up its mouth. This deposit, constantly on the increase, progresses, according to Sir Henry Rawlinson, at the rate of a mile in the lapse of



## PHYLLOSCOPUS SIBILATRIX.

thirty-five to forty years. A great city, of which the ruins are to be seen above Mahammerah, was an island in the time of Sennacherib, named Billat, and can be shown to have been still an island in the time of Alexander. At the present time it is sixty miles from the mouth of the river, and a succession of cities can be traced upon the desiccated delta below it, along the river, down to the sea.

(2171) PETROLEUM BEDS. Occur in Assam.

(2172) PERDICINÆ, Genus *Sacfa*, Blyth, *Sakpha* of the Tibetans, T. Hodgsoniæ, Blyth. This handsome species is dedicated to Mrs. Hodgson, whose accurate and tasteful delineations of Himalayan scenery will do much to attract attention to this fine field for scientific research.

The essential characters of the genus or sub-genus are as follows:—

Bill, strong with a heavy overlying upper mandible, scarpd along the cutting edges. Nares subvertical and opening towards the head. Wings and tail longer, and less bowed and gradated, and stronger than in *Perdix*; but not so long or acuminate as in *Lerva*, and about equal to *Francolinus*.

Wings with 3-4-5 quills longest and nearly equal, 1-2 not much gradated: 1st only  $\frac{1}{2}$  inch less than the longest.

Tail 16, rounded, firm.

Tarsi moderate, equal to the longest toe and nail, nude, bi-scaled in front, no spur?

Lateral toes subequal and furnished with the usual basal membrane. Nails blunt, scooped inferiorly and having a salient margin all round: orbits subnude, as in *Arboricola*.

This fine species is denominated *Sakpha* by the Tibetans. It was obtained in the western part of the province of Tsang.

(2173) PHULLAEED. In Nepaul, a kind of oak, the wood of which is in high repute for its strength and durability; the acorns are used medicinally and also serve as food for the pigs.—*Smith's Nepaul*.

(2174) PHYLLOPNEUSTE OCCIPITALIS, This was known from a specimen procured in S. India by Mr. Jerdon.—*Beng. As. Soc. Jour.* No V. of 1854.

(2175) PHYLLOSCOPUS and its immediate affines. *A Monograph of the Indian species of*, By EDWARD BLYTH.

There is no group of birds more difficult to the student of Indian Ornithology, than the very extensive series of small *Bec-fins*, or "Warblers," known to the French as *Pouillots*, and in parts of England by the name of *Pettychaps*. It is exemplified in Europe by the following four well known species.

(2176) *a*. PHYLLOSCOPUS SIBILATRIX;

## PHYLLOSCOPUS TRIVIRGATUS

*Motacilla sibilatrix*. L.: *Sylvia sylvicola*, Latham. Type of SIBILATRIX, Kaup.

• (2177) *b*. PHYLLOSCOPUS BONELLI; *Sylvia Bonelli*, Vieillot: *Sibilatrix Nattereri*. Temminck.

(2178) *c*. PHYLLOSCOPUS TROCHILUS; *Motacilla trochilus*, L.: *Sylvia fitis*, Bechstein: also, according to M. Degland, *Sibilatrix icterina*, Temminck (nec Vieillot); *Sibilatrix flaviventris*, Vieillot; *Sibilatrix angusticauda*, Gerbe; and *Sibilatrix tamarixis*, Crespigny.

(2179) *d*. PHYLLOSCOPUS RUFUS; *Curuea rufa*, Brisson: *Sylvia collybita*, Vieillot; *sibilatrix loquax*, Herbert; and by the older British ornithologists erroneously assigned to *Motacilla hippolais*, L. In addition to these four, in N. Africa, Dr. Ruppell describes

(2180) PHYLLOSCOPUS UMBROVIRENS; *Sylvia umbrovirens*, Ruppell (described but not figured in his *Neuen Wirbelthieren Vogel*, p. 112), from Abyssinia.

(2181) PHYLLOSCOPUS BREVICAUDATUS; *Sylvia brevicaudata*, Ruppell, Atlas, t. 35, from Kordofan.

Another that will probably have to be added to the European fauna is

(2182) PHYLLOSCOPUS BREVIROSTRIS; *Sylvia brevirostris*, Strickland, P. Z. S. 1836, p. 98. Procured at Smyrna. Differs from *Phylloscopus rufus* in its greater size, and from *Phylloscopus trochilus* "in the shortness of the beak, and the dark colour of the legs."

Lastly, two species are briefly described in Dr. Horsfield's catalogue of Javanese birds, *Trans. Lin Soc.* XIII. 156; neither of which can we identify with Indian species: viz,

(2183) PHYLLOSCOPUS JAVANICUS; *Sylvia javanica*, Horsfield: seemingly affined to our *Phylloscopus Magnirostris*. And

(2184) PHYLLOSCOPUS MONTANUS; *Sylvia montana*, Horsfield: apparently affined to our *Phylloscopus tristis*. Of *Phylloscopus montanus*, (Horsf.), the late lamented Hugh E. Strickland mentioned that "the wing is 2 in. long, gradated, with the fifth quill longest."

Mr. Strickland adds, from Java,—

(2185) PHYLLOSCOPUS TRIVIRGATUS; *Sylvia trivirgata*, Temminck; a species referable to Mr. Hodgson's Group *Abrornis*; and it is probable that others of this minor group, from the Archipelago, remain to be described.

In addition to the above, there occurs as an *avis rarissima* in Europe, the common Indian *Motacilla proregulus*, Pallas (*Regulus modestus*, Gould), which strictly appertains to the series under review, has been obtained in Dalmatia and in Britain; while three of the European species have been stated to occur in India, but

at a time when the various Indian *Pouillots* were undescribed and the multiplicity of distinct species of them was unsuspected. As neither of them, however, would appear to have been met with in the country since the numerous Indian species have been recognised, we are led to infer that certain other species were mistaken for them; and it is highly probable that the *Sylvia sibilatrix* of Dr. Royle's list [Note. *Ill. Him. Bot. Introd.* p. lxxvii. In this list are enumerated "*Sylvia sibilatrix*, s. *rufa* (plains), *S. trochilus*, and several species undetermined." It is not probable that either of the names specified is correctly applied; nor certain others in the same list, as especially *Gallus sonneratii*?] refers to our *Phylloscopus nitidus*, and Mr. Gould's *S. trochilus* of W. India (*Proc. Zool. Soc.* 1805, p. 90.) to our *Phylloscopus viridanus*; and perhaps M. Temminck's *S. trochilus* of Japan may likewise prove to refer to some nearly affined species, which he failed to distinguish from the *trochilus* of Europe. [Note. Some Japanese birds which we saw with Mr. Gould, sent by M. Temminck, and identified by him with European species, certainly presented differences more or less marked. We especially remember the Japanese Robin, Jay, and Bullfinch. The last is probably *Pyrrhula griseiventris*, Lafresnaye, *Rev. Zool. de la Soc. Cuv.* 1841, p. 241.—Since this note was penned, we have seen Mr. Gould's figure of the Japanese Bullfinch, in his 'Birds of Asia,' where it is designated *P. orientalis*, Temminck and Schlegel. The Jay, too, is cited by the Prince of Canino as *Garrulus Japonicus*.]

The Indian species have been described under various generic names; and even now it would not appear that systematists are agreed whether to range the accepted typical form from that of *Motacilla trochilus*, L., under *Phyllopneuste* of Meyer (1822), which included also the distinct form of *Mot. hippolais*, L. regarded by Mr. G. R. Gray (in 1841) as typical of *Phyllopneuste*,—or in *Phylloscopus*, Boie (1826), of which *M. trochilus* is cited as typical. In M. Degland's 'Ornithologie Européenne' (1849), *M. hippolais*, L., with three European congeners is referred to *Hippolais*, Brehm (1828), the typical species being termed *Hippolais polyglotta*, (Vieillot); and *M. trochilus* and its congeners are assigned to *Phyllopneuste*. An older name than *Hippolais*, Brehm, occurs, however, in *Ficedula*, Koch (1816), which is adopted by Dr. Rüppell for the *Pouillots*, [*Systematische uebersicht der vogel nord-ost Africka's* (1845), p. 57,] and by Schlegel for both groups; [*Revue Critique des Oiseaux d'Europe* (1844), p. p. XXV—VI.] but it is faulty as implying these birds to be fig-eaters (or *Beccaficos*), whereas all of the series are exclusively insectivorous, and in no way to be confounded with the highly frugivorous *Fauvettes*.

[Note. The four European species described by M. Degland under *Hippolais* are as follows:—

(2186) 1. *Hippolais polyglotta*; *Motacilla hippolais*, L.; *Sylvia polyglotta*, Vieillot: *Hippolais salicaria*, Bonap.

(2187) 2. *Hippolais icterina*; *Sylvia icterina*, Vieillot (nec Temminck): *S. hippolais* apud Temminck, *Manuel*, 2nd edit., (1820).

(2188) 3. *Hippolais olivetorum*; *Sylvia olivetorum*, Strickland.

(2189) 4. *Hippolais elaica*; *Salicaria elaica*, Lindermayer: *Ficedula ambigua*, Schlegel.]

In former papers, Mr. Blyth followed Mr. Gray's arrangement, but with this error, that certain Indian species were assigned to *Phyllopneuste* apud Gray (V. *Hippolais*, Brehm); whereas upon referring to the characters of this genus, as specified by M. Degland, we find that he had misapprehended it, and incline now to suspect that with it should be united the divisions *Culicipeta*, Blyth, and *Abrornis*, Hodgson.

In a series of 22 species actually before us, excluding *Regulus*, we observe that one only, the European *Phylloscopus sibilatrix* (type of *sibilatrix*, Kaup), is remarkable for the comparative great length of its wings; whereof the first primary is minute and the second is nearly as long as the third. In all the rest, the small first primary is considerably less diminutive, and the second is much shorter than the third: the proportions varying, however, to some extent, and the wing being more or less rounded in different species; affording a good differential character in several instances. In general, the wings are shorter and more rounded than in the European *Phyllopneuste trochilus*, but looking to the ensemble of characters, it seems doubtful whether more than three divisions can be retained in the whole series under review. These are *Phylloscopus*, certain species of which (constituting the *Reguloides*, Blyth,) offer a close approximation to *Regulus*, and serve to indicate the true systematic position of that genus,—*Regulus* (which M. Degland and others have arranged near *Parus*),—and *Culicipeta* (including *Abrornis*), which should perhaps be merged in *Phyllopneuste* (V. *Hippolais*). Under these three groups only, we now comprise the following Indian species.

I.—Genus *Phylloscopus*, Boie, apud G. R. Gray. Type *Motacilla trochilus*, L. [Note. A better average type exists in *Phylloscopus rufus*, V. *curruca*, *rufa*, Brisson.]

(2190) PHYLLOSCOPUS RAMA; *Sylvia rama*, Sykes, P. Z. S. 1832, p. 89. There appear to be two races of this bird, differing a little in shade of colour, but in no other particular that we can discern. The bill is rather thicker and the form less slender than in most others of the genus; and together with the colouring, approximate it to *Calamoherpe*, Boie, for a species of which it



## PHYLLOSCOPUS MAGNIROSTRIS.

might be mistaken at first sight; \* but the form of the wings and tail, and general character, sufficiently indicate its true position to be as here arranged.

Length 5 in., by  $7\frac{1}{2}$  in. in alar expanse: wing  $2\frac{3}{8}$  to  $2\frac{1}{2}$  in.; 1st primary  $\frac{9}{16}$  in., the second  $\frac{5}{8}$  in. shorter than the third, which about equals the 4th and 5th: tail  $2\frac{1}{8}$  in.; its outermost feather  $\frac{1}{8}$  in. shorter: bill to gape  $\frac{5}{8}$  in.: tarse  $\frac{3}{4}$  in. Irides dark. Bill dusky above, light caraneous below: legs light brown, tinged with plumbeous on the joints. Plumage, above uniform light greyish-brown; below pale or albescent, passing to white on the chin, middle of belly and vent: lores, continued as a slight streak passing over the eye, and the orbital feathers, pale.

This bird is very common in Lower Bengal during the cold season, upon sandy soil above the tideway of the rivers; haunting babul topes and scattered trees near villages, as well as hedges and bush-jungle. Those of S. India have a slight ferruginous tint throughout; but we can detect no further difference. It would not appear to inhabit the sub-Himalayan region.

\* [Note. We have three Indian species of *Calamohерpe*, all distinct from those of Europe.

(2191) *a. Calamohерpe brunescens*; *Agrobates brunescens*, Jerdon. Very like the European *Calamohерpe arundinaceus* (*Turdus arundinaceus*, L.; *Sylvia turdoides*, Meyer); but easily distinguished by the form of the wing, in which the second or first developed primary is constantly  $\frac{1}{2}$  in. shorter than the next, and the third, fourth, and fifth are subequal.

(2192) *b. Calamohерpe dumetorum*. Blyth, J. A. S. XVIII. 815.

(2193) *c. Calamohерpe agricola*, Jerdon, *Madr. Journ.* XIII, pt. II, p. 131; J. A. S. XIV, 595. This much resembles the European *Calamohерpe salicaria* (*Motacilla salicaria*, Gmelin; *Calamohерpe alnorum*, Brehm; *Mot. arundinacea*, Lightfoot); but is readily distinguished from it, as is also *Calamohерpe dumetorum*, by the same difference in the proportion of the primaries as exists in the species before cited.

The three Indian species of *Calamohерpe* accordingly tend to approximate *Phylloscopus* in the form of the wing, and they have also less aquatic habits than their European congeners.]

(2194) PHYLLOSCOPUS MAGNIROSTRIS. Blyth, J. A. S. XII, 966: *Phyllopneuste indica*, Blyth J. A. S. XIV, 593: *Ph. trochilus*? apud Hodgson, Gray, *Zool. Misc.* 1844, p. 82.

Length 5 to  $5\frac{1}{2}$  in., by  $8\frac{1}{2}$  in. across: wing  $2\frac{5}{8}$  to  $2\frac{3}{4}$  in., its first primary measuring  $\frac{3}{4}$  in., and the second being  $\frac{1}{2}$  in. shorter than the third, which does not quite equal the 4th and 5th: tail 2 to  $2\frac{1}{8}$  in., its two outer feathers on each side very slightly graduating: bill to gape

## PHYLLOSCOPUS AFFINIS.

$\frac{5}{8}$  in.: tarse  $\frac{3}{4}$  in. Irides dusky. Bill dusky plumbeous above, fleshy horn-colour at base of lower mandible. Legs albescent, plumbeous. Plumage, duskyish or infuscated olive-green above, having a faint tinge of tawny, especially on the wings and tail; the medial larger coverts of the wings being tipped with albescent greenish: a narrow but conspicuous pale yellowish supercilium, and the lower ear-coverts are partly of the same hue: under-parts pale; the breast tinged with ashy, mingled with faint yellowish, and the rest of the lower parts are more or less of a pure yellowish-white. The tawny hue of the wings and tail resembles that of the upper parts of the European *Ph. rufus*, whence the name of the latter species.

The species appears to be generally diffused over the country, and we have seen specimens from the eastern coast of the Bay of Bengal, and also one from Chusan. We have been informed that it has a pleasing song.

(2195) PHYLLOSCOPUS LAGUBRIS. Blyth, J. A. S. XII, 668. Length  $4\frac{3}{4}$  to  $4\frac{1}{2}$  in., by  $7\frac{1}{2}$  in. across: wing  $2\frac{1}{2}$  in.; first primary  $\frac{3}{4}$  to  $1\frac{3}{8}$  in., and the 2nd  $\frac{5}{16}$  in. shorter than the third, which does not quite equal the 4th and 5th: tail  $1\frac{7}{8}$  in., subeven. Bill to gape nearly  $\frac{5}{8}$  in. Tarse  $\frac{3}{4}$  in. Irides dusky. Bill dusky above, and also on the medial part of the lower mandible; the rest amber-coloured. Legs pale greenish-dusky. Plumage, above dusky olive-green, nearly as in the last species, but without the tawny shade; also a similar pale yellowish supercilium, and tips to the medial wing-coverts: below albescent, faintly tinged with yellow medially, and laterally with the hue of the flanks.

Common in Lower Bengal during the cold season, and more or less so over the country generally.

(2196) PHYLLOSCOPUS AFFINIS; *Motacilla affinis*, Tickell, J. A. S. II, 576: *Ph. flaveolus*, Blyth, *passim*; *Abrornis xanthogaster*, Hodgson, Gray, *Zool. Misc.* 1844, p. 82. Length  $4\frac{3}{8}$  to  $4\frac{1}{2}$  in., by  $6\frac{1}{2}$  to 7 in. in expanse: wing  $2\frac{1}{8}$  to  $2\frac{3}{8}$  in.; having the 1st primary  $\frac{3}{4}$  in., and the second  $\frac{5}{16}$  in. shorter than the third, which almost equals the 4th and 5th: tail  $1\frac{3}{4}$  to  $1\frac{7}{8}$  in., its outermost and penultimate feathers very slightly graduating: bill to gape  $\frac{1}{2}$  in., or a trifle more: tarse  $\frac{3}{4}$  in. or nearly so. Irides dark. Bill dusky above, amber-coloured below: legs pale brownish-dusky, tinged with yellow; the soles more or less yellowish. Plumage, above fuscous olive-green, with an extremely faint tawny tinge; no pale tips to the medial wing-coverts: supercilia, cheeks and under parts, pale sullied yellow, brightest on the middle of the belly, with a slight tawny tinge in some, and the breast and flanks a little infuscated.

This species might be supposed to be the young of the preceding, in corresponding yellow-

## PHYLLOSCOPUS FUSCATUS.

ish garb to the young of *Ph. trochilus* and *Ph. rufus*; but in minute comparison of freshly killed specimens, they are seen to be distinct. The bill is more feeble, and much more compressed, in *Ph. affinis*; whereas in *Ph. lugubris* it is very little compressed, and the rectal setæ are considerably more developed. The colour of the legs is also very different, being in *lugubris* pale greenish-dusky, while in *affinis* there is a strong tinge of brown. From examination of a great number of specimens, we feel convinced that the colouring here described is permanent. The species is common in Lower Bengal, more so above the tideway of the rivers, and we believe that it is generally distributed over India.

(2197) PHYLLOSCOPUS INDICUS; *Sylvia indica*, Jerdon, *Madr. Journ.* XI, 6: *Phylloscopus griseolus*, Blyth J. A. S. XVI, 443.

Length  $5\frac{1}{4}$  in., by  $7\frac{1}{4}$  in.: wing  $2\frac{5}{8}$  in. having the first primary  $\frac{7}{8}$  in. long, and the second  $\frac{3}{8}$  in. shorter than the third, which equals the sixth, and is scarcely shorter than the fourth and fifth: tail 2 in.: bill to gape  $\frac{5}{16}$  in.: tarse  $\frac{3}{4}$  in. Irides very brown. Bill dusky above, below pale amber, interior of the mouth whitish, with scarcely a tinge of yellow. Tarse externally and the toes above, light brown; internally and beneath, yellow. Plumage, above uniform dull ash-colour, without a tinge of green: supercilia clear pale yellow: lower-parts pale dull yellowish, purer on the middle of the belly, and the rest more or less tinged with dull tawny.

This species appears to be found chiefly in the peninsula of India, and is rare in Lower Bengal.

(2198) PHYLLOSCOPUS FUSCATUS, Blyth, J. A. S. XI, 113. *Phylloscopus brunneus*, Blyth J. A. S. XIV, 591, (the young).

Length 5 to  $5\frac{1}{4}$  in. by  $7\frac{1}{8}$  to  $7\frac{3}{8}$  in.: wing  $2\frac{1}{4}$  to  $2\frac{3}{8}$  in.; having the first primary  $\frac{1\frac{3}{8}}{1\frac{3}{8}}$  to  $\frac{1\frac{5}{8}}{1\frac{5}{8}}$  in., and the second  $\frac{5}{16}$  in. shorter than the third, which equals the 6th and is a little shorter than the 4th and 5th; tail  $2\frac{1}{8}$  in., with its outermost feathers  $\frac{3}{16}$  in. shorter than the middle ones: bill to gape nearly  $\frac{5}{8}$  in.: tarse  $\frac{7}{8}$  in. Irides dark hazel. Bill dusky above, yellowish at base of lower mandible; inside of the mouth rather pale yellow: legs greenish-brown. Plumage, above uniform olive-brown; below albescent, purest on the throat and middle of belly, and weakly tinged with a ferruginous or ruddy hue on the pale supercilia, sides of neck, flanks and lower tail-coverts, and more faintly on the breast; axillaries also weak ferruginous, with the fore-part of the under-surface of the wing; and the primaries are slightly margined with pale rufescent: no trace whatever of a wing-band. The young (*Phylloscopus brunneus*, Blyth, passim,) resemble the adults in colour, but the wings and tail are rather shorter, and the plumage is of somewhat more open texture.

Not rare in Lower Bengal during the cold

## PHYLLOSCOPUS TRISTIS.

season; but commoner, it would seem, to the eastward, and especially in Arakan.

(2199) PHYLLOSCOPUS VIRIDANUS, Blyth J. A. S. XII, 967: [Note. *Phyllopneuste rufa* apud Blyth, J. A. S. XI, 191: and *Ph. affinis*, *Ann. Mag. N. H.* 1843, pt. 2, p.] *Abornis tenuiceps*, Hodgson, Gray, *Zool. Misc.* 1844. p. 83. (Perhaps *Phylloscopus trochilus*, W. India apud Gould).

Length  $4\frac{3}{4}$  to  $5\frac{1}{8}$  in., by  $7\frac{1}{4}$  to  $7\frac{1}{2}$  in.: wing  $2\frac{1}{4}$  to  $2\frac{1}{2}$  in.: its first primary  $\frac{5}{8}$  to  $\frac{3}{4}$  in., and the second  $\frac{1}{4}$  in. shorter than the third, which equals the fourth and fifth; tail  $1\frac{3}{4}$  to 2 in. Bill to gape nearly  $\frac{5}{8}$  in.: tarse  $\frac{1\frac{1}{8}}{1\frac{1}{8}}$  to  $\frac{3}{4}$  in. Irides dusky. Bill dusky horn-colour above, the under mandible yellowish except towards tip. Legs pale greenish-plumbeous. Plumage, above light dull olive-green, beneath greenish-albescent: a pale yellow streak over the eye; and a slight whitish bar on the wing, formed by the tips of its larger coverts.

The commonest species of the genus in Lower Bengal; and we believe generally diffused. The only sound we have heard it utter is a faint *tiss-yip* frequently repeated; but never a number of times in continuous succession, like the much louder *tsih tseh* of the European *Ph. rufus*.

(2200) PHYLLOSCOPUS NITIDUS, Blyth, J. A. S. XII, 965: *Muscicapa nitida* (?), Latham, Franklin: *Sylvia hippolais* apud Jerdon, *Madras Journ.* XI, 6; *Hippolais Swainsoni*, Hodgson, Gray, *Zool. Misc.* 1844, p. 82. (Probably *Sylvia sibilatrix* of Royle's list.)

Length  $4\frac{1}{2}$  to  $4\frac{3}{4}$  in., by  $7\frac{3}{8}$  to  $7\frac{1}{2}$  in. across: wing  $2\frac{3}{8}$  to  $2\frac{5}{8}$  in.; having the first primary  $\frac{9}{16}$  to  $\frac{5}{8}$  in., and the second  $\frac{3}{8}$  in. shorter than the third, which equals the fourth and exceeds the fifth: tail  $1\frac{7}{8}$  to 2 in.: bill to gape  $\frac{5}{8}$  in.; and tarse  $\frac{3}{4}$  in. Irides dark. Bill caraneous dusky, the lower mandible pale; and legs light brownish, tinged with yellow on the toes. Plumage, above of a much livelier green than in any of the preceding, resembling that of the European *Ph. sibilatrix*; below unsullied pale yellowish, brightest about the breast; and there is a pale wing-band, formed by the tips of the larger coverts of the secondaries.

This pretty species appears to be very generally distributed, but is somewhat rare in Lower Bengal.

(2201) PHYLLOSCOPUS TRISTIS. Blyth, J. A. S. XII, 966. *Sylvia trochilus* apud Jerdon, *Madr. Journ.* XI, 6.

Length  $4\frac{1}{2}$  to 5 in.,  $6\frac{1}{2}$  to  $6\frac{7}{8}$  in.; of wing  $2\frac{1}{8}$  to  $2\frac{1}{2}$  in.; the first primary  $\frac{3}{4}$  in. (in large specimens), and the second  $\frac{1}{4}$  in. shorter than the third, which equals the fourth and fifth: tail  $1\frac{3}{4}$  to 2 in.: bill to gape  $\frac{1}{2}$  in.; and tarse  $\frac{9}{16}$  to  $\frac{3}{4}$  in. Irides dark. Bill blackish tinged with yellow at base of lower mandible; and gape also yellow: legs dull black. Plumage, above uniform dull



## PHYLLOSCOPUS TROCHILOIDES

brown: below albescent, with a faint tinge of ruddy or ferruginous on the pale supercilia, sides of neck, breast and flanks and no tinge of yellow except on the axillaries and fore-part of the wing underneath, which are almost pure light yellow. Bill small and slender.

A common species, and generally diffused. Once observed in great abundance, together with *Calamoherpe agricola*, haunting low bushes near the Calcutta salt-water lake.

(2202) PHYLLOSCOPUS OCCIPITALIS; *Phyllopneuste occipitalis*, Jerdon, Blyth, J. A. S. XIV, 593.

Length  $4\frac{3}{4}$  in.: of wing  $2\frac{5}{8}$  in.; the first primary  $\frac{3}{4}$  in., and the second  $\frac{5}{16}$  in. shorter than the third, which nearly or quite equals the fourth and fifth: tail 2 in., even or squared. Bill to gape  $\frac{5}{8}$  in. Tarse  $\frac{1}{16}$  in. Alar and caudal feathers unusually firm. Bill light dusky above, pale below: legs pale. Plumage, above mingled green and ashy, the latter prevailing on the back, the former on the rump, wings and tail; crown dusky, with whitish supercilia, and a conspicuous pale medial line, broader and tinged with yellow at the occiput: a slight but distinct yellowish-albescent wing-band; the fore-part of the wing brightish green; and its margin, with the axillaries, pure light yellow. Lower-parts albescent, mingled with yellowish, and very faintly tinged with ruddy. Inner webs of the three outer tail feathers on each side narrowly bordered with white, the ante-penultimate less so.

This pretty species we have only seen from the Deyra Doon and from S. India. In colouring, it approximates the groups *Reguloides* and *Abrornis*; but the remarkable firmness of its wings and tail is peculiar, and prohibitive of its association with either.

The next three species (constituting the subgroup *Reguloides*, Blyth,) have, like the last, a pale medial streak on the crown, and they greatly approximate the genus *REGULUS* in figure and proportions, and even in colouring (minus the developed crest); but their habits are those of other PHYLLOSCOPI.

(2203) PHYLLOSCOPUS TROCHILOIDES; *Acanthiza trochiloides*, Sundevall (1837): *Phyllopneuste reguloides*, Blyth, J. A. S. XI, 191, XII, 963 (nec *Reguloides* apud Hodgson).

Length of a male  $4\frac{7}{8}$  in., by  $7\frac{1}{4}$  in.: wing  $2\frac{1}{2}$  in.; its first primary  $\frac{1}{16}$  in., and the second  $\frac{3}{8}$  in. shorter than the third, which equals the fifth and is a little shorter than the fourth; but, in some, those three are equal: tail  $1\frac{7}{8}$  in., even. Bill to gape  $\frac{5}{8}$  in., or nearly so. Tarse  $1\frac{1}{16}$  in. Length of a female  $4\frac{1}{2}$  by  $6\frac{7}{8}$  in.; wing  $2\frac{3}{8}$  in.; and tail  $1\frac{3}{4}$  in. Irides dark. Upper mandible dusky, the lower yellow: and legs yellowish-brown tinged with plumbeous. Plumage, above dull green, a little infuscated, with two conspicuous yellowish-white bars on the wing, formed by the

## PHYLLOSCOPUS CHLORONOTUS.

tips of the greater and lesser coverts: below albescent-greenish, a little tinged with yellow: a broad yellowish-white or pale yellow supercilium; and above this a broad dusky band, leaving the middle line of the crown dull green like the back, but paling at the occiput; below the supercilium the colour is also dusky: axillaries, with the fore-part of the wing underneath yellow; and the outermost and penultimate tail-feathers have a narrow whitish margin to their inner web.

Inhabits the sub-Himalayas, and visits Lower Bengal in some abundance during the cold season. We have obtained one so late as March 15th in the vicinity of Calcutta.

(2204) PHYLLOSCOPUS PROREGULUS; *Motacilla proregulus*, Pallas: *Regulus modestus*, Gould; and, in abraded plumage, *R. inornatus*, Blyth, J. A. S. XI, 19, and *Phylloscopus montanus*, Hutton, Blyth, *Catal.* No. 1105: *Phyllopneuste nitidus*, Hodgson, G. R. Gray.

Length generally about 4 to  $4\frac{1}{4}$  in., by 6 to  $6\frac{1}{2}$  in. across: wing  $2\frac{2}{8}$  in. its first primary  $\frac{1}{2}$  in., [Note. In one only, of several specimens,  $\frac{5}{8}$  in.] and the second not  $\frac{5}{16}$  in. shorter than the third, which exceeds the sixth, and nearly or quite (in different species) equals the fourth and fifth: tail  $1\frac{1}{2}$  to  $1\frac{1}{4}$  in., even. An unusually large specimen measured  $4\frac{1}{2}$  by 7 in.; wing  $2\frac{1}{4}$  in.: tail  $1\frac{3}{4}$  in. Bill to gape nearly  $\frac{5}{8}$  in.: tarse  $\frac{1}{16}$  in. Irides dark, upper mandible dusky, the lower yellow except at tip; and legs rather pale brown, without any plumbeous tinge. Bill nearly as much compressed as in *Regulus*. Plumage, above olive-green, brightest on the rump, wings and tail: crown dusky, with a pale mesial line, sometimes well defined, but in new plumage not very distinct; and in much worn or abraded plumage, it often disappears altogether, and the upper-parts are then dingy greyish-brown, with scarcely a tinge of green: two conspicuous yellowish-white bars on the wing, the hinder more broad; and behind this is a dark patch, corresponding to the black seen in *Regulus*: tertiaries conspicuously margined with whitish (as more or less in *Regulus*), and secondaries and some of the primaries slightly tipped with the same: axillaries, with the fore-part of the wing underneath, pale yellow: supercilia and lower parts greenish-albescent.

Common in Lower Bengal, where a few perhaps breed; but the great majority retire to the mountains for that purpose. [Note. A reputed nest, taken near Calcutta, is described J. A. S. XII, note to p. 965.] As an exceedingly great rarity, it has been met with in Dalmatia and in England. Habits as in other species of *Phylloscopus*, and not (as in *Regulus*) gregarious: song-note nearly similar to that of *Phylloscopus sibilatrix* but considerably weaker.

(2205) PHYLLOSCOPUS CHLORONOTUS;

## PHYLLOSCOPUS.

*Abornis chloronotus*, Hodgson, Gray's *Zool. Misc.* p. 82; G. R. Gray, 'Appendix to catalogue specimens presented by Mr. Hodgson to the British Museum,' p. 152; *V. Regulus modestus* apud Hodgson.

Resembles the last, but is smaller, with bill conspicuously shorter and darker-coloured, and the rump pale canary-yellow, strongly contrasting with the hue of the back; the median coronal line much more conspicuous, and the pale margins of the tertiaries less so. Its size is that of the European *Regulus cristatus*.

Length  $3\frac{1}{2}$  in., or a trifle more: wing  $1\frac{7}{8}$  to 2 in.; its first primary  $\frac{9}{16}$  in., the second  $\frac{1}{2}$  in. shorter than the third, which does not equal the fourth and fifth. Bill to gape about  $\frac{1}{2}$  in., and tarse  $\frac{5}{8}$  in.: tail  $1\frac{1}{4}$  in. to  $1\frac{3}{8}$  in. Upper mandible blackish, the lower pale except towards tip. Legs pale. In other respects like the last, from which it is at once distinguished by its pale pure yellow rump.

This minute species appears to be peculiar to the sub-Himalayan region, where extensively distributed.

Genus *Regulus*, (antiq.) Cuvier.

Capt. Hutton states that both *R. ignicapillus* and *R. cristatus* of Europe inhabit the N. W. Himalaya. We have seen only a single male specimen, procured by Capt. Thomas at Simla; and this perfectly resembles *R. cristatus*, except in being considerably larger, and the fine flame-coloured interior crest would seem to be more developed. Length of wing  $2\frac{3}{8}$  in., and of tail  $1\frac{1}{2}$  in. In several British specimens of *R. cristatus*, the corresponding measurements are 2 in., and  $1\frac{3}{8}$  in., with the rest in proportion. Should this difference in size prove constant, the race might be denominated *R. Himalayensis*; requiring, however, to be first minutely compared with the N. American *R. satrapa*, Lichtenstein (*V. tricolor*, Jardine). Mr. Hodgson would not appear to have met with a true *Regulus* in Nepal.

(2206) Genus *Culicipeta*, Blyth, J. A. S. XII, 968

"General structure of *Phylloscopus*, but having a narrow Flycatcher's bill and armature of rictus, the ridge of the upper mandible angulated, and the breadth of the bill evenly attenuating." Such are the characters of the first or typical species, to which may be added that the claws, especially that of the hind-toe, are longer and less curved. In other species, however, the form grades to that of *Phylloscopus*; but there is a general and marked resemblance of colouring throughout the series, indicative of their unity as a group, and which would help to separate it from the European type *Phyllopneuste* (*V. Hippolais*). In general, the upper-parts are green, the lower bright yellow wholly or in part, and the crown exhibits the colouring (variously modified) of *Phylloscopus occipitalis* and of the subgroup *Reguloides*; while the two or three outer tail-feathers are, in most of the species, largely

## PHYLLOSCOPUS.

marked with white on the inner web. Their habits appear to be quite similar to those of the *Phylloscopi*.

(2207) *Culicipeta Burkii*; *Sylvia Burkii*, Burton, P. Z. S. 1835, p. 153: *Acanthiza arrogans*, Sundeval (1837); *Cryptolopha auricapilla*, Swainson, 2 $\frac{1}{4}$  Centen. (1837): *Muscicapa bilineata*, Lesson, *Rev. Zool. de la Soc. Cuv.* 1839, p. 104.

Length  $4\frac{3}{8}$  by  $6\frac{1}{2}$  in.: wing  $2\frac{1}{4}$  in.; its first primary  $\frac{3}{4}$  in., and the second  $\frac{3}{8}$  in. shorter than the third, which equals the sixth or seventh (in different specimens), and is rather shorter than the intervening two or three: tail  $1\frac{3}{4}$  in.: bill to gape exceeding  $\frac{1}{2}$  in.; and tarse  $\frac{1}{2}$  in. Irides dark. Bill dusky above; underneath, with the legs, pale amber or brownish-yellow, darker on toes. Plumage, above bright yellowish olive-green; below full siskin-yellow throughout; the cheeks and sides of neck intermediate: over each eye a broad black streak reaching to the occiput, leaving the middle of the head greenish, slightly flanked with ash-grey: tail dusky, its middle feathers margined with the hue of the back, and the inner web of the outermost white nearly throughout, as also the terminal half of that of the next. Some have a light yellowish wing-band, which in others is barely indicated.

This pretty little bird is not uncommon in Lower Bengal during the cold season, and like the rest of its tribe retires to the sub-Himalayan region to breed. Its bill has more decidedly the Flycatcher form than in any of the following.

(2208) *Culicipeta Cantator*; *Motacilla cantator*, Tickell, J. A. S. II, 576: *O. schisticeps*, Hodgson, Gray's *Zool. Misc.* 1844, p. 82; G. R. Gray, 'Appendix to catalogue of specimens presented by Mr. Hodgson to the British Museum,' p. 153.

Length  $4\frac{1}{4}$  in., by  $6\frac{3}{8}$  in. expanse: wing  $2\frac{1}{4}$  inches; with primaries as in *C. Burkii*: tail  $1\frac{3}{4}$  in. Bill to gape nearly  $\frac{5}{8}$  in.; and tarse  $\frac{5}{8}$  in. Irides dark. Bill light dusky above, amber-coloured below: legs light yellowish-carneous, with a leaden tinge. Plumage, bright olive-green above, yellower on the wings and tail: throat, cheeks, supercilia, lower tail-coverts, and margin of wing, bright yellow; the belly and flanks greyish-white: greater wing-coverts tipped with pale yellow, forming a slight bar on the wing: on each side of the crown a broad black band; and an intermediate narrower greenish one, becoming yellower upon the occiput: upper tertiaries very slightly margined at the tips with yellowish-white; and the tail-feathers have a narrow yellowish-white internal border.

This pretty species is rare in Lower Bengal, becoming commoner to the westward. The bill is narrower and the rictal setæ are less developed, while the claws (especially that of the hind toe) are shorter and more curved, than in *C. Burkii*.



## PHYLLOSCOPUS

(2209) *Culicipeta Pulchra*; *Abrornis pulcher*, Hodgson, Blyth, J. A. S. XIV, 592; *Abr. erochroa* (?), Hodgson, Gray, *Zool. Misc.* 1844 p. 82 (undescribed); G. R. Gray, Appendix to catalogue, p. 152.

Length  $4\frac{1}{4}$  in., of wing  $2\frac{1}{8}$  in., with primaries as in *C. Burkii*; tail  $1\frac{3}{8}$  in.; bill to gape  $\frac{1}{2}$  in., and tarse nearly  $\frac{3}{8}$  in. Bill dusky above, below yellow or amber coloured; and tarse pale. Plumage, above dull olive-green, brighter on the rump and margins of the wing and tail-feathers, those of the primaries yellowish, and a pale rufescent bar across the wing: two broad black streaks on the crown, and between them a dull greenish streak flanked with ashy: supercilia also dull green; but the orbital feathers are yellow; and the entire under-parts are pale dull yellow, or albescent-yellowish, becoming of a deeper yellow on the belly and lower tail-coverts: tail having its three outer feathers wholly white, save the terminal half of their outer web, together with the tip of the inner web of the ante-penultimate and slightly of the penultimate.

Inhabits the Nepal and Sikim Himalaya. [Note. Mr. G. R. Gray suggests that this may be the young of his *Abr. erochroa*, Hodgson, which he thus describes:

"Length 5 in.; bill from gape  $\frac{1}{2}$  in.; tarse  $\frac{3}{8}$  in.; wings under  $2\frac{1}{2}$  in. Upper surface olive-green; a streak over each eye from the nostrils, under surface and lower part of back, yellowish white, brightest on the back [rump?] and vent: wings with the tips of the greater coverts broadly margined with rufous-white: quills brownish black, narrowly margined with yellowish-green: tail slaty-brown, margined with yellowish-green, the outer feathers principally white."

We suspect that this description merely refers to a fine specimen of *C. pulchra*; and may remark that the present is the only species of the series of which the Society possesses but an indifferent specimen. Of the rest, *C. castaneoceph* we have never seen; but all of the others, save four, we here describe from recent specimens shot near Calcutta! The four exceptions are—*Phylloscopus occipitalis*, and *Ph. chloronotus*, and the two *Culicipeta* which next follow; and to these may be added the *Regulus*.

(2210) *Culicipeta schisticeps*; *Abrornis schisticeps*, Hodgson, Blyth, J. A. S. XIV, 592; *Phyllopneuste xanthoschistos*, Hodgson, Gray, *Zool. Misc.* 1844, p. 82. (undescribed); G. R. Gray, 'Appendix to Catalogue' p. 151.

Length  $4\frac{1}{4}$  in.; of wing  $2\frac{1}{4}$  in., with primaries as in *C. Burkii*; tail  $1\frac{5}{8}$  in.; bill to gape  $\frac{5}{8}$  in.; and tarse  $\frac{3}{8}$  in. Bill dusky above, below amber coloured; and feet apparently pale brownish plumbeous. Plumage, above pale ashy, passing to greenish-yellow on the rump, wings and tail: below, with the cheeks and lower half of the car-coverts, wholly bright yellow: whitish-grey supercilium and narrow medial streak across the

## PHYLLOSCOPUS

crown, and two broad ill-defined lateral streaks of rather a more dusky grey than that of the back: outermost and penultimate tail-feathers only, white on their inner webs. The young have looser plumage and all the colours less intense.

This appears to be very common throughout the sub-Himalayan territories, and is likewise met with in Arakan; but it appears never to descend from the hills. According to Capt Hutton, it is a common species at 5000 ft. elevation, and commences building in March. The nest would appear to resemble those of *Phylloscopus trochilus* and *Ph. rufus*. Eggs spotless white. Vide Hutton, in J. A. S. XVII, pt. II, p. 688.

(2211) *Culicipeta polio-genys*, Blyth, J. A. S. XVI, 441.

Length  $4\frac{1}{4}$  in.: of wing  $2\frac{1}{8}$  in., with the outermost primary  $\frac{5}{8}$  in. long, the second exceeding it by  $\frac{1}{16}$  in., and the third  $\frac{1}{8}$  in. shorter than the fourth, which equals the fifth and sixth: tail  $1\frac{5}{8}$  in.: bill to gape  $\frac{9}{16}$  in.; and tarse  $\frac{5}{8}$  in. Bill dusky above, yellow or amber-coloured below. Legs pale. Plumage, above dark olive-green, slightly yellowish on rump, with a conspicuous narrow yellowish-white wing-band: crown and ear-coverts dusky-grey, with blackish coronal bands; the chin, and feathers proceeding from the base of the lower mandible, greyish-white: rest of the lower-parts bright yellow: tail with its three outer feathers white on the inner web, as in *C. pulchra*.

We have only seen this well marked species from Sikim. It might be mistaken for the preceding on a very superficial view; but besides the differences in the details of colouring, its wings are much more rounded and the bill is somewhat less compressed.

(2212) *Culicipeta Castaneoceph*; *Abrornis castaniceps*, Hodgson, Blyth, J. A. S. XIV, 593; *Abr. castaneoceph*, H., Gray, *Zool. Misc.* 1844, p. 82; G. R. Gray, 'Appendix to Catalogue,' p. 152.

"Length  $4\frac{1}{4}$  in.: wing nearly  $2\frac{1}{4}$  in.: bill to gape above  $\frac{5}{8}$  in.: tarse  $\frac{5}{8}$  in. Upper surface olive-green: front and top of head, pale rufous-chestnut; hind-head and nape greyish-slate. Lower part of back and abdomen bright yellow: throat white: wings and tail brownish-black, margined with yellowish-green: greater coverts of the wings tipped with yellow, forming two bands."—G. R. Gray.

"Above vernal green: belly, vent, and croup, deep yellow. Chin to belly white, passing laterally to soft plumbeous. Top of head chestnut, bounded by black to sides. Bill and legs pale. Length 4 in.: wing  $1\frac{1}{8}$  in.: tail  $1\frac{5}{8}$  in.: bill to forehead  $\frac{3}{8}$  in.: tarse  $\frac{3}{4}$  in."—Hodgson.

Procured by Mr. Hodgson in Nepal. We have never seen a specimen.

Finally, may be noticed a Javanese species of this group.

(2213) *Culicipeta trivirgata*; *sylvia trivirgata*,

*gatus*, Strickland, figured and described in Sir W. Jardine's 'Contributions to Ornithology,' November, 1849.

"Length 4 in.; of wing 2 in. 2 l.; middle tail-feathers 1 in. 8 l.; outermost  $1\frac{1}{2}$  in.; bill to gape 5-1: tarse 7-1.

"In plumage, it greatly resembles the broader-billed but closely allied *C. Burkei* of India. Middle of crown olive-yellow, which occupies the inner webs of the feathers, the outer webs being deep fuscous, nearly black, with an olive tinge, forming a broad dark stripe on each side of the crown: between this and the eye is a superciliary streak of clear yellow: a streak of fuscous passes through the eye; the cheeks, throat, and lower-parts are bright yellow, with an olive tinge; back and wings yellowish-olive: beak horn-coloured, the base of lower mandible pale; and legs brown.

"Inhabits the island of Java."—*Strickland*.

(2214) PIDDINGTON, H., long Coroner in Calcutta: and well known for his numerous contributions to the literature of storms.

(2215) PINDALOO (or in Tamil) is the root of a tree resembling *Ricinus communis*. This is boiled and eaten by common people.

(2216) PINDUR AND KUPHINEE, two rivers in the Kemaon Himalayas, remarkable for the glaciers which occur in them.

(2217) PINJRAPOLE, or Hospital for Animals. The Jains are the great protectors of animal life. They, together with the Buddhists, are pre-eminently tender on this point, not only on the score of humanity, but from their belief in the doctrine of metempsychosis which teaches them to regard the brutes as of their own kin, the tenements not improbably of the souls of their ancestors. The celebrated King Asoka, who flourished about 250 years before Christ, was the first Hindoo sovereign known to have favoured the tenets of the Jains. His capital was Palibothra, at the junction of the Soane and Ganges. The inscription on the palaces of Delhi and Allahabad, on the rocks in Affghanistan and Girnor in Cutch, refer to the events of his reign. On one of these tablets, Asoka proclaims, that though until then hundreds of thousands of animals had been killed daily for the Royal Kitchen, from thenceforth the practice should be discontinued, as he had become religious. On another it is proclaimed that throughout his dominions, trees for the shade and shelter of men and animals, and wholesome and nutritious vegetables for their consumption shall be cultivated, it is considered probable that the Jains and Buddhists set their faces against animals suffering, as a contrast to the cruelties at the time practised by the Brahmins, and that they to some extent succeeded in shaming them down. It appears from the Ramayana that the

Brahmins of those days made offerings not only of flowers and plants but of slaughtered horses, hogs and sheep; the sacred cow herself being occasionally offered on the altar. At their feasts both butcher meat and intoxicating liquors were freely indulged in. The Brahmin hermit Bhadravaja gave a magnificent entertainment at Allahabad to Charat and his army, where venison, the flesh of the wild boar, mutton, peacocks and partridges with abundance of strong drink, furnished forth the repast. Menu considers the feast in honour of a dead relation incomplete unless where animal food is present, we have no authoritative information as to when the present absurd system crept in: that it is not countenanced by the sacred books of the Hindoos or the customs of antiquity and is a matter comparatively of yesterday is apparent. We are still more in the dark as to the introduction of hospitals for aged and diseased animals. The first we find described is that at Surat of which Ovington gives an account as he saw it in 1689, Hamilton describes it as he saw it in 1772, Heber speaks of that at Broach in 1824. There is nothing that can be adduced in their support either from the sacred works of the Hindoos, the Asoka productions or the institutes of Menu, more than may be inferred from the proverbs of Solomon that "the merciful man is merciful to his own beast." The homage to brute animals originally confined to the Jains and Buddhists, and not even making its appearance amongst them until a comparatively recent period of their history slowly extended itself amongst the Brahmins, and within almost the present generation has infected the Parsees. This comparatively enterprising and enlightened race, so far from being exempt from the degrading superstitions of the Hindoos as has been asserted, seem to have picked up some rags from the superstition of every sect and denomination with which they have come in contact, and patched it on to their own comparatively simple creed. The superstition of the banians, like themselves a great trading community, seems to have been peculiarly attractive to them, and the Pinjrapole accordingly being their pet institution, speedily secured the sympathies of the Zoroastrians.

We confess ourselves very imperfectly informed as to the origin of this most extraordinary form of the faith. It is said that in the reign of the emperor Acbar, 300 years ago, a pious married pair from the Malabar Coast resolved on making a pilgrimage to Benares. When their journey was near an end, the wife was taken in travail, and a man-child was born to her; unable to carry him on, they left him one evening behind them on the moor. Next day the grass was found blazing everywhere around, but the infant was lively and unburnt, the blaze refused to approach him. He was taken charge of by the priests and pronounced at once a child from heaven, the



offspring of the deity. The boy waxed and grew, and shewed an early aptitude for knowledge and when he reached the age of manhood visited the various shrines, castles, and courts around, preaching a form of faith altogether new, specially inculcating tenderness to, and care of animal life. He was the first Maharaja of the Banians. There are about two hundred now alive who claim direct descent from him and are believed by their worshippers, incarnations of the deity. They exercise the most absolute authority both spiritual and temporal over their votaries, who bow with the most abject submission to their behests. If there be any truth in the pamphlet lately published regarding them, their lives and conversation are scarcely such as becomes the heaven descended.

The Bombay Pinjrapole owes its origin as much to the parsee worship of sacred dogs as to the superstitions of the Jains. In 1813, the dogs running wild and masterless in the street had become so intolerable a nuisance that an order was issued for killing them, and the result of this was a succession of street rows and disturbances betwixt the dog-destroyers and dog-worshippers, which led the latter to offer a sum of money for each mangy cur that was released from durance and made over to them. Some 30,000 or 40,000, of these canine incarnations of the deity, are in this way annually packed off, the bulk of them being sent to an island near the mouth of the Taptee to starve, or to worry or infect each other. So cruel are the tender mercies of the wicked and superstitious.

Great expense was incurred on this account, and as the funds began to diminish from failing zeal, Motichund Amerchund, the great Jain merchant, and partner of Sir Jamsetjee Jejeeboy exerted himself and obtained an agreement on the 18th October 1834 from Shree Gosainjee Maharaja, and Setts of the Hindoos, Parsees, and others by which they bound themselves to raise taxes on opium, cotton, sugar, bills of exchange, and pearls "that the lives of a great many animals may be saved, which is an act of great charity," the Shrawuks, or Jains agreed to raise a fund amongst themselves for the required ground and building, the rates are collected and sent yearly to the managers appointed, namely, Bomanjee Hornusjee Wadiajee, Sir Jamsetjee Jejeebhoy, Motichund Amerchund, Vukutchund Khooshalehund. The agreement signed by about 450 merchants, contains a clause stating that any excess of the funds may be applied to such charitable objects as may be approved of by the trustees. As there are now about seven lacs of rupees (£70,000), in excess, here is an ample fund for the extension of education or for a thousand purposes directly tending to elevate the moral and intellectual condition of the country. Whilst the Bombay pinjrapole was under the vigilant superintendence of our Parsee

Baronet, the funds poured amply in and the institution was most carefully conducted. Since 1851, the place has become a sink of animal and moral corruption. Prices on commodities, like other prices, fall all ultimately on the consumers. The Lancashire Cotton-spinners are not perhaps aware that from their pockets are drawn the means of supporting one of the most filthy and disgusting establishments for the torture of brute beasts mind of man or fiend can conceive.

It is chiefly from the date of its wealth that the Bombay institution has become a nuisance and though we are disposed to overlook all and every thing in our great Parsee Baronet, in consideration of the darkness and ignorance of the age in which he was brought up, it will never do for his kinsmen, still less for his descendants, to be presented to royalty, or to the Baronetage of England, as worshippers of unclean brute beasts, the keepers of knackers yards or mangy dog kennels. The existence of the pinjrapole is of itself enough to show the immeasurable distance that intervenes between those who delight in the self-assumed designation of the "Saxons of the East" and their rulers, the Saxons of the West.

We have already so minutely described the pinjrapole that we need not further refer to the filthy, disease-begetting and life-shortening nuisance, than to advert to how fearfully it fails to fulfil any one of the ends it professes to aspire after. To the horse, the ox, the goat, the sheep and the dog more especially the first and the last, fresh air and exercise are indispensable, not only to health and enjoyment, but to existence.

"He is a hunter of the hills, to him confinement is a curse, and followed by the worst of ills."

The noble beast who probably has never once within his life been tied up for forty-eight hours on end, whose master daily even and morn, when there was no work for him to do, saw that he had air and exercise—is, from the day that he enters the pinjrapole, to that when his dead carcase is dragged out of it, pinned down to one spot as firmly and irrecoverably as is the insect in the cabinet of the entomologist. Better die a hundred deaths at once than thus be tortured, and slain by inches. The cattle, sheep and goats fare but little better; the dogs are infinitely worse off than the horse: it not unfrequently happens: that animals which have been sent there by mistake, are recovered by their owners, a single hour in the kennels sends them back covered with vermin, and infected with the most loathsome diseases. Lions, tigers, panthers, and other carnivora are occasionally kept in the pinjrapole; it is forgotten that for every day that one of these is kept alive, one sheep or goat must die to feed him. A butcher sometimes receives a large sum

## PINEAPPLE FIBRES.

for abstaining from the slaughter of sheep or kine. The man pockets the money and keeps his bargain. As the market must be supplied the number spared at one shop or house is made up next door. The precept outwardly attended to in the letter is violated at every turn we take in spirit.

Yet the remedy is singularly easy, the pinjrapole has some £70,000 in the treasury. Let them buy up and wall in a square mile of ground in some of the adjoining islands or on the mainland where both fresh and salt water are available, and give the poor brutes they pretend to preserve after their natural term of existence is ended, a chance of living and of enjoying that measure of peace and comfort their circumstances permit.

We trust these things will be taken into consideration by the natives who worship the pigeon, the cow and the dog, and that they will cease endangering the lives of their fellow creatures before force is employed against them. The first duty of the Municipal Commissioners is to see to the health of the community: whatever is incompatible with this must be put down and speedily. They are armed with unlimited power by the law, though force is the last thing they would dream of resorting to so long as any hope remained of the influence of persuasion. When natives ask to be put on a footing with Europeans, let them be met with the single word "pinjrapole" and that should put them down.—*Bombay Standard*. 1858.

(2218) PINEAPPLE FIBRES. At Singapore, the process of extracting and bleaching the fibres is exceedingly simple. The first step is to remove the fleshy or succulent side of the leaf. A Chinese, astride on a narrow stool, extends on it, in front of him, a pineapple leaf, one end of which is kept firm by being placed beneath a small bundle of cloth on which he sits. He then with a kind of two handled plane made of bamboo removes the succulent matter. Another man receives the leaves as they are planed, and with his thumb nail loosens and gathers the fibres about the middle of the leaf, which enables him by one effort to detach the whole of them from the outer skin. The fibres are next steeped in water for some time, after which they are washed in order to free them from the matter that still adheres and binds them together. They are now laid out to dry and bleach on rude frames of split bamboo. The process of steeping, washing, and exposing to the sun is repeated for some days until the fibres are considered to be properly bleached. Without further preparation they are sent into town for exportation to China.

Nearly all the islands near Singapore are more or less planted with pine-apples, which, at a rough estimate, cover an extent of two thousand acres. The enormous quantity of leaves that are annu-

## PINUS GERARDIANA.

ally suffered to putrify on the ground would supply fibre for a large manufactory of valuable pina cloth. The fibres should be cleaned on the spot. Fortunately the pineapple planters are not Malays but industrious and thrifty Bugis, most of whom have families. These men could be readily induced to prepare the fibres. Let any merchant offer an adequate price and a steady annual supply will soon be obtained.—*Journ of the Indian Archipelago*, Vol. ii. No. viii. August 1848, page 523.

(2219) PINUS. Cone-bearing pines with long leaves, like the common Scotch fir, are found in Asia, and as far south as the Equator (in Borneo) and also inhabit Arracan, the Malay Peninsula, Sumatra, and South China. It is a very remarkable fact that no Gymnospermous tree inhabits the Peninsula of India; not even the genus *Podocarpus*, which includes most of the tropical Gymnosperms, and is technically coniferous and has glandular woody fibre; though like the yew it bears berries. Two species of this genus are found in the Khasia, and one advances as far west as Nepal. The absence of oaks and of the above genera (*Podocarpus* and *Pinus*) is one of the most characteristic differences between the botany of the east and west shores of the Bay of Bengal. At Churra there is but one pine (*Pinus Khasiana*) besides the yew, (and two *Podocarpi*) and that is only found in the drier regions. Singular to say, it is a species not seen in the Himalaya or elsewhere, but very nearly allied to *Pinus longifolia*, though more closely resembling the Scotch fir than that tree does.—*Hooker Him*: Vol. II. page 282.

(2220) PINUS DEODARA. Devadaroo, or Devdar, is the name the tree is known by amongst the natives where it grows.

A tree of great size, a native of the mountains north of Rohileund. It differs from *P. Larix* in many respects, but most conspicuously in being destitute of the bractes which project beyond the scales of the strobile or cone.

The tree is so exceedingly replete with resin, as to yield a very large proportion of tar. A manufactory of that article was formerly begun, near the skirts of the Almora mountains by Mr. Gott.—*Roxburgh's Flora Indica*. Vol. III. p. 653.

(2221) PINUS EXCELSA.

Kuel, HIND.

(2222) PINUS GERARDIANA.

Chilgoza, HIND.	Rhec, HIND.
Neoza, „	Newr, „
Ganobur, „	

This species occurs in British Garhwal near Bumpa, which appears to be its most Southern habitat. The seeds are edible and are exported



## PHOSPHORESCENCE.

from Cabul and Kunawur, in considerable quantity for sale.

### (2223) PINUS LONGIFOLIA.

Cheer, HIND.		Surul, HIND.
Checl, „		Sulla. „

Of this species there are two varieties in the Himalayas, one with twisted the other with straight fibres, and thus the former is called *Outcha*, its wood being fit only for burning and the latter puka by the natives. The wood of the latter is admirably fitted for building purposes, but if exposed to the action of the weather and water it is quickly destroyed. Lathing made of it is named "dadur."

### (2224) PINUS PINASTER. *Penaster* or *Cluster Pine*.

Kebar, HIND.

### (2225) PINUS PINEA. *Stone Pine*.

### (2226) PINUS ROYLEANA. *Deodar* of *Nepal*.

### (2227) PINUS STROBILUS.

Sundbur, HIND.		Serar, HIND.
<i>Jameson's Saharunpore Report.</i>		

### (2228) PITHECUS, Orang-utang. The following species are known.

(2229) PITHECUS BROOKEI Bl. P. Wurm-bii et F. Abellii, Owen (though neither the species described by Van Wurm, nor that by Dr. Abel, a skull of which is figured in Pl. V. and VI. Mias Rambii, Malay, Brooke. Adult male from Sumatra. A native of Borneo.

(2230) PITHECUS SATYRUS. (L.) apud Brooke, S. Muller, and others: Mias Pappan, Malay, Brooke, Adult female (?) from Borneo.

(2231) PITHECUS MORIO, Owen. Mias Kassar, Malay, Brooke, aged female from Borneo.

(2232) PITHECUS OWENII. Bl. small Orang with short fore-arms. Adolescent female Hab. unknown.—*Ben. As. Soc. Jour. No. 4, page 383.*

(2233) PITHECUS CURTUS, Malay Mias. Chapin.

(2234) PHOSPHORESCENCE, The phenomenon of phosphorescence, says Dr. Hooker, is most conspicuous on stacks of fire-wood. At Darjiling, during the damp, warm, summer months (May to October), at elevations of 5000 to 8000 feet, it may be witnessed every night by penetrating a few yards into the forest—at least it was so in 1848 and 1849; and during my stay there billets of decayed wood were repeatedly sent to me by residents, with inquiries as to the cause of their luminosity. It is no exaggeration to say that one does not need to move from the fireside to see this phenomenon, for if there is a partially decayed log amongst the fire-wood it is almost sure to glow with a pale phosphoric light. A stack of fire-wood, collected near my

## PHYLLANTHUS NIRURI.

host's (Mr. Hodgson) cottage, presented a beautiful spectacle for two months (in July and August), and on passing it at night, I had to quiet my poney, who was always alarmed by it. The phenomenon invariably accompanies decay, and is common on oak, laurel (*Tetranthera*), birch, and probably other timbers, it equally appears on cut wood and on stumps, but is most frequent on branches lying close to the ground in the wet forests. I have reason to believe that it spreads with great rapidity from old surfaces to freshly cut ones. That is a vital phenomenon, and due to the mycelium of a fungus, I do not in the least doubt, for I have observed it occasionally circumscribed by those black lines which are often seen to bound mycelia on dead wood, and to precede a more rapid decay. I have often tried, but always in vain, to coax these mycelia into developing some fungus by placing them in damp rooms, &c. When camping in the mountains, I frequently caused the natives to bring phosphorescent wood into my tent, for the pleasure of watching its soft undulating light, which appears to pale and glow with every motion of the atmosphere; but except in this difference of intensity, it presents no change in appearance night after night. Alcohol, heat, and dryness soon dissipate it; electricity I never tried. It has no odour, and my dog, who had a fine sense of smell, paid no heed when it was laid under his nose.

As far as my observations go, this phenomenon of light is confined to the lower orders of vegetable life, to the fungi alone, and is not dependent on irritability. I have never seen luminous flowers or roots, nor do I know of any authenticated instance of such, which may not be explained by the presence of mycelium or of animal life. In the animal kingdom, luminosity is confined, I believe, to the Invertebrata, and is especially common amongst the Radiata and Mollusca; it is also frequent in the Entomostracous Crustacea, and in various genera of most orders of insects. In all these, even in the sertulariæ, I have invariably observed the light to be increased by irritability in which respect the luminosity of animal life differs from that of vegetable.—*Hooker Him: Jour: Vol. II, pages 150 to 152.*

(2235) PLATINA has been discovered in Ava.

(2236) PHALÆNA. PATROCLUS L. (Cramer, pl. CIX, a, b,) a well known Burmese moth, a splendid species common in collections from China, Assam, Sylhet, and Arakan.

### (2237) PHYLLANTHUS NIRURI, Lin.

Kilanelly, TAM.		Annual Phyllanthus ENG.
Booien Aoonlah, DUK.		Boovooshirum, SANS.
Nela ooshirikch, TEL.		

The white root, bitter leaves, and tender shoots of this plant, are all used in medicine by the Indians, who consider them as deobstruent, diure-

tic and healing, the two first are generally prescribed in powder or decoction, in cases of an over-secreted, acrid bile and in Jaundice, an infusion of the latter together with Vendium seed, is supposed to be a valuable remedy in chronic Dysentery.—*Ains. Mat. Med.* p. 83.

## (2238) POA CYNUROIDES.

Dab, HIND.

Much used in making ropes.

(2239) POLE-CAT, *Black-faced Pole-cat of Tibet.*

Tail one-third of the entire length. Soles clad. Fur long. Above and laterally, sordid fulvous, deeply shaded on the back with black. Below, from throat backwards with the whole limbs and tail, black. Head pale with a dark mask over the face. Snout to vent 14 inches. Head less 3. Tail only 6. Tail with hair, 7. Palma 1½. Planta 2¾.

*Habitat*, the plain of Central Tibet.

A specimen of this interesting animal was obtained in the district of U, on the south of the Sanpú, and was brought along with a specimen of the Tibetan Badger (*Taxidea Leucurus*.) The skin was in good condition, and had the limbs and skull complete. It is seemingly a male, and certainly, a mature animal. The length from snout to vent is 14 inches and the tail is 7 more, so that *Toufæus* only of Tibet, and *Flavigula* of the Himálaya, can compare with it in size.—*Mr. Hodgson in Beng. As. Soc. Journ. No. VI. May 1849.*

(2240) POYLANTHUS TUBEROSA. Cultivated in gardens at Bombay, worn by native women in their hair.—*Graham. (Thomson's Record of General Science Vol. IV. p. 301.)*

(2241) PONGAMIA ATROPURPUREA of *Wallich*, very large tree, abundant in Tenasserim provinces. Flower a beautiful purple.—*Malcom's Travels in South Eastern Asia, Vol. I p. 191.*

(2242) PONG, the Tamil and Malayala name of a tree, *Dalbergia arborea*, which is very heavy and remarkably strong. It grows to about eighteen inches in diameter, and twenty feet in height, and spreads its branches to a great extent. The native carpenters prefer this wood for the knees of vessels, and also for general uses where strength is required. The trunk of the tree is applied to the uses of the block-maker, for shivers, blocks, &c.—*Edye, Mal and Can.*

(2243) POON OR PEON-SPARS. The light-red peon from the forests of Coromandel and Mysore, which can be procured at the port of Mangalore, on the Malabar coast, is considered the best of the growth of India, for the general purposes of lower-masts, top masts, and yards.

The peon-masts, as to strength, compared with

Riga, &c. spars for masts, are superior to any; the weight of those of the proper sort is about the same as Riga fir, and their durability is very great; a set of lower-masts would probably last fourteen or twenty years. During Mr. Edyé's visit supplies of spars could be procured at Mangalore from November to March, but January is the best period. Even then, he said, the transaction should be managed without any previous notice, nor should the number required be made public, but advantage should be taken of the native lists of prices which the merchants will present to the purchaser. If the demand is made public, the market price will advance and combination follow.—*Edye, Mal. and Can.*

## (2244) POPULUS CILIATA.

Chilon, HIND.

Paharee Peepul, HIND.

Ghurb, ,

## (2245) POPULUS PYRIFORMIS.

Sufaida, HIND.

(2246) POREAL PAINI, the Tamil and Malayala name of a wood which may be ranked among the best sort of the Dupi Marams, or Painis, and next to the peons on the coast of Malabar. It might be used for small yards of vessels. At times this wood is called Puni Pains by some of the northern natives, it is of a light-red colour, and grows to about eighteen inches in diameter, and sixty feet long.—*Edye, Mal. & Can.*

(2247) POTOWAR, a town containing remains of Greek sculpture.

## (2248) POTAMOGETON TUBEROSUM.

Suwal, HIND.

This plant is much used in purifying sugar.

(2249) POYANG, an aboriginal race believed by the Malays and Chinese of Malacca, Naning and Rambau, to possess supernatural powers.

(2250) PRINSEP, two brothers, eminent as officers of the Bengal Government and as learned men. H. T. Prinsep as a statesman and numismatist. J. Prinsep as a philologist.

(2251) PSIDIUM POMIFERUM is abundant in some places of Burmah but is not extended over the whole country, and is certainly not indigenous. It grows to the height of twenty or thirty feet, with leaves of pale green, and beautiful large white blossoms. The fruit is about the size of a pear, and a little yellowish when ripe, full of hard seeds, the size of buck-shot. Foreigners generally despise it, as they do many other Indian fruits, which a few experiments would teach them to admire. There are several varieties,—*Malcolm's Travels in South Eastern Asia, V. I. page 180.*

(2252) PTEROSPERMUM ACERIFOLIUM. A useful timber tree affording good shade.

(2253) PUBERTY, amongst Mahomedan



## PUNICA GRANATUM.

girls is called *Baligh-hona* : pyllee sir mylee hona ; also Burron men milna. *Herkl.*

(2254) PUDDIEM. The Puddiem or Payah, a Nepaul tree, resembles, in its leaf and wood, the English cherry, the wood being held in sanctity by the natives.—*Smith's Nepaul.*

(2255) PULLIA MARUM, known to Europeans by the name of "tamarind." There are two sorts of the tamarind wood, the light and the dark. These trees grow to about seven or eight feet in diameter at the butt, while that of the body of the tree is about five feet. This part is seldom more than ten feet long, when it branches out into curves of various dimensions. It is considered valuable, from the quantity of fruit it produces, which is used medicinally. The acid is used in cookery. These trees are cultivated in gardens, and spread their branches to a great extent. The timber is remarkably heavy and hard, much like lignum vitæ; and is used generally for sheeves in blocks, and such purposes.—*Edye M. sc.*

(2256) PULO CHIKUKOH. A little island near Singapore.

(2257) PULO TIMMUKUL. A little island adjoining Singapore, 60 yards in diameter and feet high.

(2258) PUNA BALLE in Tamil, and Punga Marum in Malayala (*Pongamia glabra*). This is a beautiful tree and of much value; it grows to about two and a half feet in diameter, and from ten to fifteen long, spreading its branches to a great extent, and into curves of various dimensions, which are valuable for native uses, particularly in building country vessels. It produces a fruit from which oil is extracted, and used for lamps, &c. The Arabs prefer this oil to any other to mix with chunam, for the purpose of covering the bottoms of their vessels to preserve them from worms; it is also used for the purpose of curing rheumatic pains, by being applied warm with friction.—*Edye, M. and C.*

(2259) PUNICA GRANATUM. The Pomegranate is cultivated to a very small extent in gardens by both Burmese and Europeans. (*Mason.*) The roots are hard, heavy, woody, knotty, covered with a bark yellowish grey externally, internally yellow, inodorous, astringent, devoid of bitterness, very rich in tannic acid to which they owe their established vermifuge properties. The ancients used these roots for the expulsion of tape-worm, but the practice had fallen into neglect when it was revived by Buchanan and others. The bark of the root is given in a decoction of 2 ounces in 2 lbs. of water, reduced by evaporation to 12 ounces. This quantity is divided into 6 doses to be taken daily, and repeated for four or five days.

The flowers (*balanistum*) are rich in tannic and

## PUTTOOAS.

gallic acid, and are used in dyeing, and in medicine as astringents; with alum they make a beautiful red ink.—*O' Sh. p. 338.*

(2260) PUN-JAY-REE, Hind. A caudle given to lying-in-women.—*Herkl.*

(2261) PUOAM, the Tamil name of a tree of a light-red colour (*Schlechteria*) much like the Spanish mahogany. It is generally curved in its growth, and is considered very durable. It grows to about twenty-four inches in diameter, and seldom more than twenty feet high. It produces a fruit which the natives pickle, and from which also they extract an oil, which they use for rheumatic gout, bruises, and various complaints: it is considered by them to be valuable. The weight of this wood is about thirty-seven and a half pounds the cubic foot.—*Edye M. & C.*

(2262) PUOAM PARASOM, the Tamil name of a tree (*Butea*) with which the natives of Malabar are well acquainted, and which they use for the masts and yards of pattamahs. It grows to about sixty feet high, and fifteen inches in diameter: it may be considered inferior to the mast peon before described.—*Edye M. and C.*

(2263) PURITY, Mahomedans follow the Jews in their attention to outward purity. Before praying, it is necessary that one be undefiled. There are degrees of defilement, the least of which requires that the hands, arms and feet be washed before praying and for this purpose Mosques are always provided with cisterns or tanks of water: in the desert sand is used. After greater impurities it is necessary that the whole body be washed, hence the longer they remain undefiled the purer their life; Wuzzu, expresses the ablution and Hedas, the state of defilement, during the continuance of which they cannot pray. The Mulana Abu Ashah was said to use the water of purification twice in a month—that is, his life was so pure that for a whole fortnight he was not so much defiled as to make necessary a total ablution. *Vir præcipue emissionem seminis fœdat at mulier menstruorum.*—*Journ. Ind. Arch. Vol. V. No. 11.*

(2264) PUSHTOO. V. AFFGHAN.

(2265) PUTRANJIVA ROXBURGHII.

Jeapota,	Jootce,
Putrajiva.	

Nuts strung round the necks of children to keep them in health. Extensively sold in the bazars of upper India.

(2266) PATTEE, Hind. a Mahomedan rite held the third day after a woman's confinement.—*Herkl.*

(2267) PUTTOOAS OR JUANGA, a forest tribe inhabiting the tributary Mahals of Cuttack to the South of Singbhoom, in the Mehals or Killahts of Keonjur, Pal Leyra, Dheknaht, and

## QUERCUS.

Hindole. They are said to number 1,500 persons of all ages and to occupy 15 different localities, thirty villages in Keonjur, and six or seven in Pal Leyra and Hindole. Their stature is diminutive, men 5 ft. 2 in. women, 4 ft. 3 in. or 4 in. The men dress like the peasantry of the country: the women however only cover their

## QUERCUS SEMICARPIFOLIA.

persons in front and behind by a bunch of twigs with the leaves attached, kept up by a strip of bark or a string of beads. These leaves are changed daily. Their pursuits are chiefly those of the chase, in which they employ dogs, and the bow and arrow.—*Ben. As. Journ. No. 4 of 1856.*

## Q.

(2268) QUAH-LAY, Malay. (*Mucuna pruriens.*)

(2269) QUERCUS, OAK.

Baalut, ARAB.	Quercus. LAT.
Eeg, DAN.	Dab, POL.
Eik, DUT.	Roble Carbahlo, PORT.
Chene, FR.	Dub, RUS.
Eiche, GER.	Roble, SP.
Quercia, IT.	Ek, SW.

A genus of well-known timber trees (*Quercus*), embracing about 150 species. Several species are indigenous in the Tenasserim provinces.—Wallich found seven different species of oak *Quercus fenestrata*, *turbinata*, *velutina*, *Amherstianus*, *Tirbbæ*, growing in Burmah and on the Tenasserim Coast, and all afford useful timber, though inferior to the English oak. No oak nor chestnut ascends above 9000 feet in the interior of Sikkim, where they are replaced by a species of hazel (*Corylus*); in the North Himalaya, on the other hand, an oak (*Quercus semecarpifolia*, see vol. i. p. 187) is amongst the most alpine trees, and the nut is a different species, more resembling the European. On the outer Sikkim ranges, oaks (*Q. annulata*?) ascend to 10,000 feet, and there is no hazel. It is not generally known that oaks are often very tropical plants; not only abounding at low elevations in the mountains but descending in abundance to the level of the sea. Though unknown in Ceylon, the Peninsula of India, tropical Africa, or South America, they abound in the hot valleys of the Eastern Himalaya, East Bengal, Malay Peninsula, and Indian islands; where perhaps more species grow than in any other part of the world. Such facts as this disturb our preconceived notions of the geographical distribution of the most familiar tribes of plants, and throw great doubt on the conclusions which fossil plants are supposed to indicate.—*Hooker, Him. Jour. Vol. II. p. 140 & 336. Foulkner, Mason.*

Of this genus, Mr Jameson gives the following species as in the Saharanpore gardens.

(2270) QUERCUS MUTABILIS.

(2271) QUERCUS DILATATA, HIND. Mohro, Kilong and Tilong,

(2272) QUERCUS ACUMINATA, HIND. Hunne,

(2273) QUERCUS NITIDA,

(2274) QUERCUS CORIACEA,

(2275) QUERCUS ANNULATA, HIND. Hunne. Phuliat, and Funiat.

(2276) QUERCUS. The following are other Indian species of this genus.

(2277) QUERCUS INCANA, Himalayan Oak.

Ban also Bang, HIND.

Its acorns are sold in the Bazaars of the N. W. Provinces under the name of Shah Baloot.

(2278) QUERCUS ACUMINATA.

Hunnee, HIND.

(2279) QUERCUS ANNULATA.

(2280) QUERCUS CORIACEA.

(2281) QUERCUS DILATATA.

Mohroo; also Kilong also Tilong, HIND.

(2282) QUERCUS, GUNGOOTRIENSIS.

(2283) QUERCUS, LANATA VELLANUGINOSA.

Reang, HIND.

In many localities in Kumaon this species takes the place and name of *Quercus incana*.

(2284) QUERCUS MUTABILIS.

(2285) QUERCUS NITIDA.

(2286) QUERCUS SEMICARPIFOLIA.

Kursoo, HIND.

Its acorns are named Shah Baloot.



## R.

(2287) RAYAT LAUT, a sailor race of the Indian Archipelago, adventurous navigators.

(2288) RANDEA DUMETORUM, *Rubiaceae* Icon. 580.

Madoocarray marum, TAM.

This seldom exceeds the size of a large shrub and therefore scarcely merits notice here, the wood is hard and close grained. The fruit is used in Malabar to poison fish.

(2289) RATANS, GROUND. The excellent walking sticks known to the English under this name, are made from the *Rhapis flabelliformis* which grows in Lin kin and Southern China.

(2290) RAIN. As the occasional showers which fall throughout the year in England, are unknown in most Asiatic countries, the first particular to attend to in examining their climate, is the season and the quantity of the periodical rains. It is this which regulates husbandry, and on which in many countries the temperature and succession of the seasons in a great measure depend.

The most remarkable rainy season, is that called in India the south-west monsoon. It extends from Africa to the Malay peninsula, and deluges all the intermediate countries within certain lines of latitude, for four months in the year. In the south of India this monsoon commences about the beginning of June, but it gets later as we advance towards the north. Its approach is announced by vast masses of clouds that rise from the Indian Ocean, and advance towards the north east gathering and thickening as they approach the land. After some threatening days, the sky assumes a troubled appearance in the evenings, and the monsoon in general sets in during the night. It is attended with such a thunder-storm as can scarcely be imagined by those who have only seen that phenomenon in a temperate climate. It generally begins with violent blasts of wind, which are succeeded by floods of rain. For some hours lightning is seen almost without intermission, sometimes it only illuminates the sky, and shows the clouds, near the horizon; at others it discovers the distant hills, and again leaves all in darkness, when in an instant it re-appears in vivid and successive flashes, and exhibits the nearest object in all the brightness of day. During all this time the distant thunder never ceases to roll, and is only silenced by some nearer peal, which bursts on the ear with such a sudden and tremendous crash as can scarcely fail to strike the most insensible heart with awe. At length the thunder ceases, and nothing is heard but the continued pouring of the rain, and the rushing of the rising streams. The next day presents a gloomy spectacle: the

rain still descends in torrents, and scarcely allows a view of the blackened fields: the rivers are swollen and discoloured, and sweep down along with them the hedges, the huts, and the remains of the cultivation which was carried on, during the dry season, in their beds.

To persons who have long resided in India, these storms lose much of their grandeur, yet they sometimes rise to such a pitch, as to make an impression on those most habituated to them. I have been told by a gentleman who had been for sometime in Malabar, the province most distinguished for the violence of the monsoon, that he there heard a clap of thunder which produced a silence of a minute in a large party of officers, and made a great part of the company turn pale.

This lasts for some days, after which the sky clears, and discovers the face of nature changed as if by enchantment. Before the storm, the fields were parched up, and except in the bends of the rivers, scarce a blade of vegetation was to be seen: the clearness of the sky was not interrupted by a single cloud, but the atmosphere was loaded with dust, which was sufficient to render distant objects dim as in a mist and to make the sun appear dull and discoloured, till he attained a considerable elevation: a parching wind blew like a blast from a furnace, and heated wood, iron and every other solid material, even in the shade; and immediately before the monsoon, this wind had been succeeded by still more sultry calms. But when the first violence of the storm is over, the whole earth is covered with a sudden but luxuriant verdure: the rivers are full and tranquil: the air is pure and delicious; and the sky is varied and embellished with clouds. The effect of the change is visible on all the animal creation, and can only be imagined in Europe by supposing the depth of a dreary winter to start at once, into all the freshness and brilliancy of spring. From this time the rain falls at intervals for about a month, when it comes on again with great violence, and in July the rains are at their height: during the third month, they rather diminish, but are still heavy: and in September they gradually abate, and are often entirely suspended, till near the end of the month, when they depart amidst thunders and tempests as they came. Such is the monsoon in the greater part of India. It is not, however, without some diversity, the principal feature of which is the delay in its commencement, and the diminution in the quantity of rain, as it recedes from the sea. In the countries which are the subject of the present inquiry, the monsoon is felt with much less violence than in India, and is exhausted at no great distance from the sea, so that no trace of it can be perceived at Candahar.

A remarkable exception to this rule, is, however, to be observed in the north-east of Afghanistan, which although much further from the sea than Candahar, is subject to the monsoon, and what is equally extraordinary, receives it from the east.

These anomalies may perhaps be accounted for by the following considerations. It is to be observed that the clouds are formed by the vapour of the India ocean, and are driven over the land by a wind from the southwest. The causes of the southwest wind require a separate discussion, unconnected with my object, which is to explain the summer rains of the kingdom of Cabul. It is sufficient for my purpose that the prevalence of this wind to the extent alleged, is universally acknowledged. Most part of the tract in which the Kingdom of Cabul lies, is to leeward of Africa and Arabia, and receives only the vapours of the narrow sea between its southern shores and the latter country, which are but of small extent, and are exhausted in the immediate neighbourhood of the coast. India lying further east, and beyond the shelter of Africa, the monsoon spreads over it without any obstruction. It is naturally most severe near the sea from which it draws its supplies, and is exhausted after it has past over a great extent of land. For this reason, the rains are more or less plentiful in each country, according to its distance from the sea, except in those near high mountains, which arrest the clouds, and procure a larger supply of rain for the neighbouring tracts, than would have fallen to their share, if the passage of the clouds had been unobstructed.

The obstacle presented to the clouds and winds by the mountains has another effect of no small importance. The southwest monsoon blows over the ocean in its natural direction; and, though it may experience some diversities after it reaches the land, its general course over India may still be said to be towards the north east, till it is exhausted on the western and central parts of the peninsula. The provinces in the northeast receive the monsoon in a different manner: the wind which brings the rains to that part of the continent, originally blows from the south west, over the Bay of Bengal, till the mountains of Hemalleh, and those which join them from the south, stop its progress, and compel it to follow their course towards the north west. The prevailing wind, therefore, in the region southwest of Hemalleh, is from the south east, and it is from that quarter that our provinces in Bengal receive their rains. But when the wind has reached so far to the north west as to meet with Hindoo Coosh, it is again opposed by that mountain, and turned off along its face towards the west till it meets the projection of Hindoo Coosh and the range of Solimaun, which prevent its further progress in that direction, or at least compel it to part with the clouds with which it was loaded. The effect of

the mountains in stopping the clouds borne by this wind, is different in different places. Near the sea, where the clouds are still in a deep mass, part is discharged on the hills and the country beneath them, and part passes up to the north west; but part makes its way over the first hills, and produces the rains in Tibet. In the latitude of Cashmeer, where the hills are considerably exhausted, this last division is little perceived: the southern face of the hills and the country still farther south is watered; and a part of the clouds continue their progress to Afghanistan; but few make their way over the mountains, or reach the valley of Cashmeer. The clouds which pass on to Afghanistan are exhausted as they go, the rains become weaker and weaker, and at last are merely sufficient to water the mountains, without much affecting the plains at their base.

The above observations will explain, or at least connect the following facts. The south-west monsoon commences on the Malabar coast in May, and is there very violent, it is later and more moderate in Mysore; and the Coromandel Coast covered by the mountainous countries on its west, is entirely exempt from it or only felt in the form of occasional showers. Further north, the monsoon begins early in June, and loses a good deal of its violence, except in the places influenced by the neighbourhood of the mountains or the sea, where the fall of water is very considerable. About Delhi it does not begin till the end of June, and the fall of rain is greatly inferior to what is felt at Calcutta or Bombay. In the north of the Punjaub, near the hills, it exceeds that of Delhi; but, in the south of the Punjaub, distant both from the sea and the hills, very little rain falls.

The countries under the hills of Cashmeer, and those under Hindoo Coosh, (Pukhlee, Boonere, and Swaut) have all their share of the rains; but they diminish as we go west, and at Swaut are reduced to a month of clouds, with occasional showers. In the same month (the end of July and beginning of August) the monsoon appears in some clouds and showers at Peshawur, and in the Bungush and Khuttuk countries. It is still less felt in the valley of the Cabul river, where it does not extend beyond Lughmann; but in Bajour and Punjora, under the southern projection, in the part of the Caufir country, which is situated on the top of the same projection, and in Teera, situated in the angle formed by Tukht-i-Solimaun and its eastern branches, the south west monsoon is heavy, and forms the principal rains of the year. There is rain in this season in the country of the Jaujees and Torees, which probably is brought from the north by the eddy in the winds, but I have not information enough to enable me to conjecture whether that which falls in Bunnoo and the neighbouring countries is to be ascribed to this cause or to the regular monsoon from the south west — *Elphinstone's Kingdom of Cabul*, page 126.



# RAINS OF INDIA.

*Table of monthly and yearly results of the observations of the Rain Gauge  
at the Madras Observatory from 1813 to 1854.*

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of the Monsoon months.	Total of each year.	Non Monsoon months.	Non Monsoon months before the average of 20	Non Monsoon months above the average of 20
	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	In.	In.	In.
1813	"	"	0.425	"	0.275	3.700	1.275	0.825	2.325	5.100	28.750	3.975	* 37.825	4.510	8	8	
14	"	"	"	"	"	"	1.600	4.825	8.450	7.100	6.600	3.700	17.490	3.2215	15	15	
15	1.650	"	"	"	"	"	6.475	"	2.850	6.250	33.175	4.800	* 44.225	* 55.200	11	11	
16	0.100	0.725	"	"	0.200	0.550	4.625	3.875	9.500	6.825	12.325	1.450	20.600	40.075	20	—	20
17	0.350	"	"	"	0.175	0.175	1.775	3.475	7.700	19.500	24.325	6.250	* 50.075	* 63.725	13	13	
18	"	"	"	0.600	"	0.750	12.650	6.400	5.400	17.900	25.600	7.780	* 61.280	* 77.080	26	—	26
19	"	"	"	2.500	"	0.125	3.300	1.300	5.900	3.000	10.800	0.700	14.500	27.625	13	13	
20	"	"	6.760	0.500	17.170	0.850	3.520	3.170	1.700	12.280	4.500	19.700	* 36.480	* 70.140	34	—	34
21	3.600	"	0.320	1.700	"	1.100	1.200	3.170	7.300	13.020	11.350	4.350	28.720	47.110	19	19	
22	1.870	"	"	0.620	"	1.770	0.550	6.700	2.370	20.570	21.370	3.370	* 45.210	* 59.090	14	14	
23	1.450	"	0.920	"	0.270	2.050	2.870	3.150	4.400	10.400	0.900	0.200	11.600	26.610	15	15	
24	1.270	"	"	"	0.050	0.450	0.250	2.650	0.470	14.250	10.270	3.950	28.470	33.610	5	5	
25	0.170	"	"	"	4.250	1.500	3.070	7.670	2.500	15.700	9.960	7.350	* 33.010	* 53.170	20	—	20
26	"	"	"	"	1.050	8.520	2.100	9.570	2.100	0.820	26.040	11.050	* 37.910	* 61.250	24	—	24
27	8.600	0.070	"	"	23.300	3.020	4.900	2.520	4.440	13.710	22.120	5.980	* 41.810	* 88.660	47	—	47
28	1.620	"	4.310	0.720	0.400	0.130	3.370	7.300	5.720	9.200	2.610	2.460	14.270	37.840	23	—	23
29	0.270	3.160	0.890	0.050	1.420	2.750	1.520	2.940	2.990	6.150	8.990	5.490	20.630	36.620	16	16	
30	"	"	0.200	0.310	0.290	2.890	7.200	2.730	4.270	6.220	3.870	4.450	14.540	32.430	18	18	
31	0.040	"	0.170	"	0.940	3.900	3.130	9.500	7.200	9.350	7.930	2.190	19.470	44.350	25	—	25
32	"	0.100	"	"	0.630	0.510	1.550	2.260	7.710	5.280	0.410	"	5.690	18.450	13	13	
33	0.180	"	"	"	0.330	1.460	1.070	7.110	3.930	9.690	9.970	3.270	22.930	37.010	15	15	
34	0.060	"	"	3.650	0.200	2.430	7.980	4.100	4.870	8.010	7.320	1.290	16.620	39.010	23	—	23
35	0.060	"	3.370	1.760	0.730	6.310	3.010	3.260	11.170	10.960	1.570	23.700	41.190	18	15		
36	"	0.320	0.160	"	0.500	6.680	9.000	1.140	8.510	18.640	2.020	* 29.170	46.960	17	17		
37	"	"	"	2.230	2.560	0.110	2.650	1.690	3.800	13.790	17.170	3.190	* 34.150	47.190	13	13	
38	"	1.330	0.590	0.770	0.540	0.880	2.370	4.690	8.780	6.270	21.890	4.220	* 32.380	* 52.330	20	—	20
39	3.340	"	"	1.620	0.990	2.460	4.610	6.830	11.140	0.990	21.270	"	22.260	* 53.250	21	—	21
40	"	"	"	0.030	"	0.480	4.360	7.820	8.360	10.160	27.250	0.120	* 37.530	* 58.580	21	—	21
41	1.990	"	"	0.470	4.540	5.030	1.330	8.530	4.310	27.380	6.130	1.310	* 34.820	* 61.020	27	—	27
42	1.780	"	0.043	"	0.310	1.310	3.170	3.180	5.650	7.820	12.870	0.180	20.850	36.290	16	16	
43	6.610	"	0.690	"	4.160	1.880	1.350	2.360	4.250	6.370	5.280	7.930	19.580	* 50.880	31	—	31
44	0.674	0.495	"	"	12.703	2.661	3.217	2.657	12.420	13.503	3.669	23.229	* 40.461	* 65.228	15	15	
45	1.512	"	0.020	0.043	1.512	2.359	2.901	2.014	4.095	3.363	5.119	15.325	23.807	38.263	15	15	
46	2.938	0.228	"	"	1.314	3.706	9.121	5.343	0.922	30.586	19.391	6.896	* 56.873	* 80.475	24	—	24
47	0.062	0.270	"	0.454	0.725	3.792	3.092	9.712	5.869	16.314	18.662	22.155	* 57.131	* 80.994	23	—	23
48	"	"	"	6.377	0.100	1.857	3.869	6.126	3.092	13.933	17.285	3.112	* 34.330	* 54.751	20	—	20
49	2.504	"	"	1.123	0.035	3.901	3.580	4.886	1.648	9.191	6.141	6.806	22.133	39.815	17	17	
50	0.043	4.270	"	0.980	2.939	2.920	1.527	3.058	3.041	4.320	8.121	5.662	18.103	36.881	18	18	
51	"	"	"	"	18.603	1.261	6.496	4.338	1.700	5.629	24.816	1.446	* 31.921	* 64.319	33	—	33
52	"	"	2.623	"	2.224	1.886	7.995	2.263	6.778	20.601	19.402	8.920	* 48.923	* 72.692	24	—	24
53	2.248	"	3.367	0.772	"	0.622	4.135	1.377	2.229	9.071	11.996	"	21.064	35.814	14	14	
54	0.425	0.295	0.089	"	"	1.147	4.295	7.054	6.366	10.221	9.186	4.021	23.528	43.199	20	—	20
Sum.....	45.356	11.210	21.554	23.889	105.985	77.022	157.138	190.178	203.945	449.517	574.560	221.747	1245.824	2087.101	842	360	444
Average.	1.080	0.267	0.518	0.688	2.523	1.834	3.741	4.528	4.856	10.703	13.680	5.280	29.662	49.693	20	14	26

In the hot season, Madras is often visited with refreshing non-monsoon rains which much reduce the heat of that period, and produce forage for cattle. In 1854, Major Worster published a table of monthly and yearly results of the Observations of the Rain Gauge, at the Madras Observatory, from 1813, to 1854, showing an average annual fall of  $49\frac{1}{2}$  inches of rain during the forty two years. Of this amount,  $29\frac{1}{2}$  inches fell during the monsoon months of October, November and December, the other 20 inches falling during the other nine non-monsoon

months of the year. On looking over Major Worster's table we observe a striking connexion between the amount falling in the non monsoon months with the fall in the October, November and December following; and these falls seem to augur a copious monsoon for the monsoon year. In the 42 years of the table, there were 20 years, in which the fall in the non-monsoon months was above and 22 years in which it was under the average, and the result of an examination, may thus be briefly stated. In the 20 years when the rains of the non-monsoon

months have been at or above the average of 20 inches, the rains of the following monsoon months have likewise, in 16 years, been at or above the average of 29½ inches : and in the 22 years when the rains of the non-monsoon months have been below their average, in 15 instances, the next monsoon has been deficient.

(2291) RAMJUNNEE, a Mahomedan dancing girl.

(2292) RAMSANEHI OR FRIENDS OF GOD, A sect of Hindu schismatics in Western India.

(2293) RAJ-MALA OR CHRONICLES OF TRIPURA. A Bengali poem.

REPTILES, *inhabiting the Malayan Peninsula and islands collected or observed by THEODORE CANTOR, Esq., M.D., Bengal Medical Service.* From the Journal of the Asiatic Society, Nos. 181 and 183 for July and October, 1847.

*Note.* [Localities printed in Italics signify those from whence the animals of the Catalogue were obtained ; in ordinary type those previously given by authors. The descriptions are in most cases taken from life ; in the few in which it is expressly noted, shortly after death ; in none from specimens preserved in spirits of wine.]

## CHELONIA.

FAM. ELODIDÆ, or MARSH-TORTOISES, *Dum. and Bibr.*

SUB-FAM. CRYPTODERINÆ, *Dum. and Bibr.*

(2294) *Gen. GEOEMYDA*, Gray.

Head covered with thin continued skin ; chin not bearded. Legs strong, not fringed behind. Toes 5-4, strong, short, free, covered above by a series of shields ; claws short. Tail tapering ; shell depressed, three-keeled ; hinder edge strongly toothed. Sternum solid, broad truncated before, notched behind ; gular plate linear, band-like, small ; axillary and inguinal plates small.

(2295) *GEOEMYDA SPINOSA* (Bell.)

*Emys spinosa*, Bell apud Dum. and Bibr.

*Emys bispinosa*, Schlegel.

*Testudo emys*, Müller?

*Geoemyda spinosa*, Gray.

Shell oblong, subquadrate, keeled, flattened above, chestnut coloured, front and hinder edge strongly serrated ; vertebral plates broad, first subercoolate ; costal plates with a posterior, sub-superior areola, with a slight subconic tubercle ; beneath yellow, brown rayed ; *young* depressed, pale brown, bluntly keeled, with a distinct spine in the areola of each discal plate.

*Habit.*—*Pinang Hills*. Sumatra.

Two individuals were observed by the Hon'ble Sir William Norris, late Recorder of H. M. Court of Judicature in the Straits of Malacca, on the

Great Hill at Pinang, at a distance from water. The colour of the shell is a dirty brownish ochre, here and there with sooty rays, which numerous-ly intersect the concave sternum. The keel, the marginal spines, and the costal tubercles are nearly obliterated, and the shell presents frequent marks of corrosion. The larger individual is of the following dimensions :—

Length of the head,..... 1 <sup>5</sup>/<sub>8</sub> Inch.

Do. do. neck,..... 1 <sup>5</sup>/<sub>8</sub>

Do. do. shell,..... 8

Do. do. tail,..... 1 <sup>5</sup>/<sub>8</sub>

A large tick was firmly adhering to the throat of one of these tortoises, the presence of which however does not indicate an exclusively terres-trial life, as one species at least of the *Ricinæ* (*Ixodes ophiophilus* Müller ?) occurs on aquatic as well as terrestrial serpents. The following are the characters of *Ixodes geoemydæ*. The short sucker is depressed, slightly widening towards the bifid apex, and encased by the palpi. Above, and at a short distance from the latter, are two minute rounded fossæ. The cephalic, tetrago-nal plate is of a reddish brown colour, with a yellow spot at the posterior angle. The oval body is dark pearl-coloured. On each side close to the articulation of the posterior leg appears a small rounded horny plate. The legs are red-dish brown with a yellow spot at each of the joints, except the last. Swollen, as the tick ap-peared, it measured six-eighths of an inch in length ; half an inch in breadth.

(2296) *Gen. EMYS*, Brogniart.

Head moderate, covered with a thin hard skin ; chin not bearded. Feet short, covered with scales ; toes 5-4, strong, shielded above, webbed to the claws. Tail moderate. Shell depressed. Sternum solid, broad, truncated before, notched behind, affixed to the thorax by a bony symphysis, covered by the ends of the pectoral and abdominal plates ; axillary and inguinal plates moderate, distinct.

A.—*Vertebral plates lozenge-shaped.*—Gray.

(2297) *EMYS CRASSICOLLIS* Bell, MSS. apud Gray.

*Emys crassicollis*, Bell, apud Dum. and Bibr.

*Emys spengleri*, Var, Schlegel.

Shell ovate, oblong, rather convex, revolute on the sides and deeply toothed behind, black, slight-ly three-keeled ; keels close ; first vertebral plate elongate, six-sided ; sternum flat, pale, and keeled on the sides ; head and neck thick, black.

*Habit.*—*Malayan Peninsula*, (*Pinang*), Suma-tra, Java.

In Malayan individuals, numerously inhabiting rivulets and ponds in the valleys, the throat is whitish, and a small white spot appears on each side of the occiput. The vertebral keels and the lateral spines become obliterated with age. The



# MALAYAN PENINSULA AND ISLANDS.

largest individual observed was of the following dimensions:—

Length of the head,.....	1 $\frac{5}{8}$ Inch.
Do. do. neck,.....	1 $\frac{5}{8}$
Do. do. shell,.....	9
Do. do. tail,.....	1 $\frac{1}{2}$

It feeds upon frogs and also upon shell-fish and animal offal. Old Malay women, who may be seen after every heavy fall of rain, spending hours, rod in hand, over the overflowing ditches, out of which their huts rise, are often ludicrously disappointed on perceiving this tortoise on the hook.

B. *Vertebral plates broad, six-sided.* Gray.—

(2298) *EMYS PLATYNOTA*, Gray.

“Katong” of the Malays of the Peninsula.

Shell ovate, convex, yellow dotted, with the centre of the back quite flat, as if truncated; shields striated, nucleus central; vertebral shields broader than long, six-sided, 5th keeled; the front and hinder margin strongly toothed; sternum flat, truncated before; and slightly notched behind; tail moderate, tapering.

*Habit.*—*Malayan Peninsula, Pinang, Sumatra.*

Mr. Gray's description refers to the young animal, of which the length of the shell is given in *Proceed. Zoolog. Soc.* 1834. p. 54 as 9 inches. The representation of *Emys platynota* in *Illust. Ind. Zool.* from its size, and the strongly toothed flat front and hind margins of the shell, also appears to be a young animal. The penultimate, the fourth, vertebral shield is represented as divided in two pieces, which if so in the original, must be accidental, as normally the fourth vertebral shield is six-sided, and in size nearly equalling the preceding. The nuclei of the costal shields are more central than represented in the plate.

In the living adult animal the head, neck, shell, tail and feet are of a dirty yellowish or greenish brown, which becomes paler on the sternum. The nuclei of the vertebral shields are slightly raised. The costal shields are depressed, their sides sloping towards the nuclei, thus forming as it were very shallow hexagonal basins. The front and hind margins are broadly revolute, their toothed appearance worn off. The sternum is slightly concave in the centre. The largest individual was of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	3
Do. do. neck,.....	0	3
Do. do. shell,.....	1	7 $\frac{1}{2}$
Do. do. tail,.....	0	2 $\frac{1}{2}$

It lived in my garden at Pinang upwards of a twelvemonth, apparently without food, and it was never observed to enter a tank. The shell bears deep white marks of corrosion, in appearance like that observed in Testacea inhabiting stagnant water. The animal suffered itself to be touched with impunity, never offering to scratch

or bite. This tortoise inhabits the valleys, but is apparently not numerous.

(2299) *EMYS TRIVITTATA*, Dumeril and Bibron.

Shell smooth, entire, subcordiform, arched, yellowish green, and with three broad longitudinal black bands; jaws toothed.

*Habit.*—*Malayan Peninsula, Pinang, Bengal.*

It inhabits rivers and ponds on the Malayan Peninsula, but appears not to be numerous. In the Malayan adult animal there is a large black spot situated at the anterior, lower angle of the marginal shields, there is no trace of a keel in the centre of the vertebral shields, and the very minute nuchal shield is triangular, with the apex towards the vertebral shields. The shield is rather oval than subcordiform. The sternum is slightly arched, of a pale whitish yellow. The largest individual was of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	3
Do. do. neck,.....	0	2 $\frac{1}{2}$
Do. do. shell,.....	1	6
Do. do. tail,.....	0	2 $\frac{3}{8}$

(2300) *Gen. CISTUDO*. Fleming.

Head moderate, covered with a thin hard continued skin, Toes 5-4 webbed to the claws, web thick, with a small intermediate lobe between the claws. Tail short. Shell convex, ovate, or hemispherical. Sternum broad, rounded before and behind, completely closing the cavity of the thorax, affixed to it by a ligamentous symphysis, and divided by a cross suture between the pectoral and abdominal plates. Sternal shields twelve. Inguinal and axillary plates very small, but distinct. Marginal plates 23-27. Nuchal plate small or wanting.

(2301) *CISTUDO AMBOINENSIS*, (Daudin).

SYN.—*Testudo amboinensis*, Daudin.

*Emys amboinensis*, and *couro*, Schweigger.

*Tortue à boîte d'Amboine*, Bosc.

*Terrapene amboinensis*, Merrem.

*Kinosternon amboinense*, Bell.

*Cistuda amboinensis*, Gray.

*Terrapene couro*, Fitzinger.

*Emys Couro*, apud Wagler.

*Terrapene bicolor*, Bell.

*Emys Couro*, Var. Schlegel, apud Gray.

“Baning” of the Malays of the Peninsula.

*Habit*—*Malayan Peninsula, Singapore. Java, Amboina, Philippine Islands, Tenasserim provinces.*

Shell hemispherical, slightly three-keeled, blackish, margin broad expanded, nuchal shield linear; sternum black and yellow-varied; animal blackish, varied with yellow, head dark with two broad yellow streaks on each side.

The dorsal keels become obsolete with age, and the margin of the shell, particularly the posterior part, becomes revolute. This species appears to be numerous in the valleys, in ponds,

rivulets and paddy fields. It is very timid, withdrawing its head and limbs when handled, though it neither bites nor scratches. The largest individual observed was of the following dimensions :

Length of the head, .....	2 inch.
Do. do. neck, .....	2 $\frac{1}{8}$
Do. do. shell, .....	7
Do. do. tail, .....	1

*Gen. TETRAONYX. Lesson.*

Toes five ; nails 4-4 ; sternum solid, broad with six pairs of shields ; 25 marginal shields.

(2302) *TETRAONYX AFFINIS, N. S.*

*Young.*—Shell orbicular, its breadth exceeding its length ; the back sharply keeled longitudinally, slightly arched, laterally depressed ; costal shields with a tubercular nucleus at the posterior margin ; greyish green olive, minutely spotted with brown ; edge sharply toothed, pale greenish yellow. Sternum, truncated in front, angularly indented behind, narrow, yellow ; laterally keeled, compressed, pale yellowish green.

*Habit.*—Sea off Penang.

The outline of the shell and its composing shields strikingly resemble the young of *Cyclemys orbiculata*, Bell, \*

\* Note. *Emys dentata* Illust. Ind. Zoolog.—*Emys dhor*, Gray.—*Emys hasseltii*, Boie.—*Emys spengleri*, Var. Schlegel.—*Cistudo diardii*, Dum, and Bibr.

The nuchal shield (wanting in one individual,) is small, subrectangular or subtriangular, with the base directed backwards. The vertebral shields are strongly keeled, laterally sloping, hexagonal, broader than long, which however, with the first is less the case than with the rest ; the second, third and fourth are the broadest, and of nearly equal size ; the fifth assumes a broadly truncated triangular shape. The costal shields are nearly all as broad as long ; the first, second and third have each a tubercular nucleus in the centre of the posterior margin, the fourth is smooth, and a little smaller than the preceding. The first pair of marginal shields is truncated triangular, the second, and third subrectangular ; the fourth, sixth, and eighth pentagonal ; the rest subrectangular. In all, the posterior external angle forms a more or less sharp spine, directed over the anterior external margin of the next shield. From the first to the sixth the shields gradually increase in size, the sixth being the largest and broadest, from which the following gradually decrease towards the twelfth pair, and their angular spines become obsolete. The sternum consists of two parts : one central, and two lateral, formed by the sterno-costal processes of the two central pairs, sharply sloping towards the marginal shields. The central part is longitudinally a little concave, narrowing towards both extremities, truncated in front, angularly indented behind. The gular pair of shields is very

short, broadly subtriangular with the posterior margin concave, curved backwards. The second, and fifth pairs are of nearly equal size, subquadriangular, their external margins forming a sharp ridge. The central part of the third and fourth pairs is subrectangular, broader than long, their margins forming a sharp ridge where they join the sterno costal processes. The latter are of nearly equal size, longer than broad, their united length being less than one half of the central part of the sternum. The sixth pair is subrhomboidal, longer than broad. The axillary and inguinal pairs are large ; the former subrhomboidal or lozenge-shaped, the latter subtriangular. The head is conic ; the muzzle short pointed ; the vertex irregularly wrinkled. On the temples, cheeks, and round the orbits, and the lower jaw appear some large polygonal scales. The occiput, angle of the mouth, and the rounded tympanum are covered with similar minute scales. The eyes are large, prominent ; the iris silvery grey ; the pupil round black. The nostrils are minute, round, horizontally pierced, close together at the apex of the muzzle. The jaws are minutely toothed ; the upper has at the symphysis two larger teeth, between which fits a similar single one in the lower jaw, thus hermetically closing the mouth. The neck, the throat and the other soft parts are studded with minute tubercles, except the fore-arm, the posterior tarsal margin, and the back of the fingers and toes, which are covered with broad, but very short, polygonal scales. On the ulnar margin of the fore-arm are four to five large rounded flexible scales. The interdigital web is large and lax. The nails are strong, of nearly equal size, sharp, and arched. The conical tail reaches but little beyond the shell, with a longitudinal furrow behind the vent. The head, neck, throat and the limbs are of the same greyish green olive as the shell. The interdigital membrane is blackish, except the web connecting the fourth and fifth (nailless) toe, which is of a bright greenish yellow colour. Of three individuals observed, differing but little in size, the largest was of the following dimensions :

Length of the head, .....	0 $\frac{6}{8}$ inch.
Do. do. neck, .....	0 $\frac{3}{8}$
Do. do. shell, .....	2 $\frac{4}{8}$
Do. do. tails, .....	0 $\frac{4}{8}$

Greatest transverse diameter of the shell, 2  $\frac{1}{8}$ .

Two were at different times found in fishing stakes placed along the sea-shore of Pinang ; a third was also taken out of the sea with a small hook, baited with a shrimp. The Malays assert that this tortoise also inhabits estuaries and rivers on the Peninsula, and that it grows to a considerable size. The young is very timid, withdrawing the head and extremities when touched, and thus it remained immoveable while a sketch was taken.

From the description of the young of *Tetraonyx lessonii*, Dum. and Bibr. given in *Erpetologie*



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*Generate*, tome 2, p. 338, and from the plates of *Emys batagur* and *Emys baska*, in *Illust. Ind. Zool.*, from B. Hamilton's MSS., the present appears to differ in too many particulars, to warrant the conclusion of its being the young of those of that species.\*

\* Note. M.M. Dumèril and Bibron describe them as two distinct species; Mr. Gray is of opinion that they are identical.

The detailed description of the young will enable future observers who may succeed in examining the adult, finally to decide the question.

FAM: POTAMIDA, OR RIVER-TORTOISES, *Dum and Bibr.*

(2303) *Gen. GYMNOPUS*, Dum. and Bibr.

(*Trionyx*, Geoffroy.—*Aspidonectes*, Wagler.—*Tyrse*, *Dogania*, *Chitra*, Gray.)

Shell cartilaginous in its circumference, very broad, flexible behind, and externally not bony; sternum too narrow behind completely to cover the extremities, when the animal withdraws them under the shell,

(2304) *GYMNOPUS CANGETICUS*, (Cuvier).

SYN.—*Testudo ocellatus*, (Young) } Buchan.

*Testudo hurum*, } Ham.

*Testudo chim*, (Adult) } MSS.

*Trionyx gangeticus* Cuvier.

*Trionyx hurum*, Gray.

*Trionyx hurum*, *Illust. Ind. Zool.*

*Trionyx ocellatus*, *Illust. Ind. Zool.* (Young.)

*Trionyx gangeticus*, Var, Guerin. (Young.)

*Gymnopus ocellatus*, Dum. and Bibr. (Young.)

*Gymnopus devaucellii*, Dum. and Bibr.

*Tyrse gangetica*, Gray: Catal.

*Young*.—(*Testudo ocellatus*, B. Ham. MSS).

Head above pale olive with one large yellow spot between the eyes and a similar behind each eye; neck, limbs and posterior margin of the shell dark olive with paler round spots; shell olive with black irregular lines, and 4 or 5 central ocelli, black in the centre, edged with red, round with a black ring; sternum pale whitish-olive.

*Testudo hurum*. B. Ham, MSS. is the transition state of the former, being about changing the livery. Head yellow olive, with irregular dark lines; shell light olive, vermiculated with blackish or dark olive. The four ocelli are present, but are altered in colours and shape: the centre, instead of being black, is like the rest of the surface, light olive, vermiculated with black; the red ring is changed to black, and the outer black one to light olive. The shape is changed from round to irregular oval.

(*Adult. Testudo chim*, B. Ham. MSS.) Dark olive-green, *vermiculated*, and spotted with light olive brown. Beneath greenish white.

*Habit*.—*Malayan peninsula*, *Pinang* (Rivers and Sea-coast.) Rivers and Bay of Bengal.

It is of fierce habits, desperately defending itself by biting, emitting when excited a low, hoarse, cackling sound. At Pinang the present

species appears to be far less numerous than the two following. The largest individual was of the following dimensions:

	Feet	Inch.
Length of the head,...	0	4
Do. do neck,...	0	4 $\frac{1}{8}$
Do. do shell,...	1	11
Do. do tail,...	0	5

(2305) *GYMNOPUS CARTILAGINEA*, (Boddaert).

SYN.—*Young*.

*Testudo cartilaginea*, Boddaert.

*Testudo boddaertii*, Schneider.

*Testudo rostrata*, Thunberg?

*Testudo rostrata*, apud Schoepff, and Daudin.

*Trionyx stellatus*, Geoffroy.

*Trionyx stellatus*, apud Merrem.

*Aspidonectes javanicus*, Wagler. *Adult*.

*Trionyx javanicus*, Geoffroy.

*Trionyx javanicus*, apud Schweigger and Gray.

*Gymnopus javanicus*, Dumeril and Bibron.

*Tyrse javanica*, Gray: Catal.

*Very Young*.—Above olive green; the head and upper part of the neck with numerous small white spots, becoming larger and more distant on the cheeks and chin; on the vertex, two round black spots; on the occiput two diverging black lines; the shell with several large black white-ringed spots, between which numerous smaller indistinct white spots; margin pale white; several longitudinal ridges, composed of close minute tubercles. Beneath greenish white.

*Older*.—Above uniformly olive-green; the longitudinal ridges of the shell consisting of tubercles, more distant and proportionally smaller than in the very young.

*Habit*.—*Malayan Peninsula*, *Pinang*. Java, Dikhun, "India," "China."

This species is numerous in rivers and ponds. The largest individual observed was of the following dimensions:

Length of the head,.....	2 $\frac{1}{8}$ Inch.
Do. do neck,.....	2 $\frac{3}{8}$
Do. do shell,.....	6 $\frac{3}{8}$
Do. do tail,.....	0 $\frac{6}{8}$

(2306) *GYMNOPUS, INDICUS*, (Gray)

SYN.—*Testudo chitra*, Buchan. Ham. MSS.

*Trionyx indicus*, Gray.

*Trionyx aegyptiacus*, Var. *indica*, Gray.

.*Ill Ind. Zool.*

*Gymnopus lineatus*, Dum.\* and Bibr.

*Chitra indica*, Gray: Catal.

Shell remarkably depressed, smooth. [Note. In the living adult no longitudinal central depression is apparent, nor the outline of the costæ, as represented in the figure in *Illustrations of Indian Zoology*.] Above greenish olive, vermiculated and spotted with brown or rust colour; beneath greenish white.

*Habit*.—*Penang*, *Malayan Peninsula*, (*Estuaries*, *Sea Coast*). Rivers in India, Philippine Islands.

At Penang this species is frequently taken in the fishing stakes. The Chinese inhabitants greatly

# REPTILES OF THE

relish this as well as the preceding species of *Gymnopus* as articles of food. Individuals weighing 240 lbs. occur in the Ganges, and others of gigantic dimensions are not uncommon at Pinang. It is very powerful, and of ferocious habits. The largest individual measured:

	Feet.	Inch.
Length of the head, .....	0	6
Do. do. neck, .....	0	5
Do. do. shell, .....	3	1
Do. do. tail, .....	0	4

## FAM. THALASSIDÆ, OR TURTLES, *Dum. and Bibr.*

(2307) *Gen. CHELONIA*. Brogniart.

Body covered with horny plates; fins with one or two nails.

*Sub-Gen. Chelonia libera* (*Chelonées franches*) *Dum. and Bibr.*

Discal shields 13, not imbricate; muzzle short rounded; upper jaw slightly notched in front, toothed on the sides; lower jaw formed of three pieces, and with the edges deeply toothed; the first finger of each fin nailed.

(2308) *CHELONIA VIRGATA* Schweigger.

*SYN.*—Turtle of the Red Sea, Bruce.

*Chelonia virgata*, apud Cuvier, Guerin, Dumeril and Bibron, Gray: Catal.

*Chelonia midas*, Var. D. Gray.

*Chelonia fasciata*, Cuvier, apud Schlegel.

"Pinyu" of the Malays of Pinang.

*Young.*—Head, shell and fins greenish black; margin of the shell and fins and sternum white.

*Adult.*—Head and fins chestnut, scales edged with yellow; shell greenish yellow with chestnut rays and spots; sternum gamboge, or greenish yellow.

*Habit.*—*Malayan Seas.* Teneriffe, Rio Janeiro, Cape of Good Hope, New York, Indian Ocean, Red Sea.

This species is at all seasons plentifully taken in fishing stakes in the straits of Malacca, and is the "Green Turtle" of the European inhabitants of our Malayan settlements, and of the sea-ports of India. In size it equals *Chelonia midas*, Schweigger, which it rivals in flavour. About December and January is the season when the female deposits her eggs in the sandy beach of some sequestered island, and then the fishermen watch during the moonlight nights to "turn turtles."

The eggs are of a spherical shape, about one inch in diameter, covered by a soft hemetransparent membrane of a pale yellow colour. The expert eye of the fishermen baffles the pains with which the turtle conceals her eggs, and prodigious numbers are disinterred.

They are very rich, flavoured like marrow, and will keep for weeks although exposed to the air.

M.M. Dumeril and Bibron have pointed out the differences between the adult of the pre-

sent species and *Chelonia midas*, Schweigger, principally consisting in colours, and in the form of the vertebral and costal shields, to which may be added the comparative greater length of the frontal-nasal shields in *Chelonia virgata*, in which the breadth is one-third of the length, whereas in *Chelonia midas* it is one-half, and these proportions appear to be constant in all ages of the two species. The very young of both greatly resemble each other in colours and shape. Six living young of the present species were all of the following dimensions:

Length of the head, .....

0 <sup>7</sup>/<sub>8</sub> Inch.

Do. do. neck, .....

0 <sup>1</sup>/<sub>8</sub>

Do. do. shell, .....

2

Do. do. tail, .....

0 <sup>2</sup>/<sub>8</sub>

The following slight differences are the result of a comparison between the living young of *Chelonia virgata* and the representation of *Chelonia midas* given by Schœpff Tab. XVII. Fig. 2.

*Chelonia virgata.*

*Chelonia midas.*

- |                                                                                             |                                                                          |
|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| 1. Shell cordiform; the length exceeds the breadth by one-eighth.                           | 1. Shell ovate; the length exceeds the breadth by more than two-eighths. |
| 2. 2nd Vertebral shield much broader than 1st, and is altogether the largest of the series. | 2. 1st and 3rd Vertebral of equal demensions.                            |
| 3. 2d costal shield larger than the 3d.                                                     | 3. 2d and 3d costa equal.                                                |
| 4. Sincipital plate broader than long.                                                      | 4. Sincipital plate longer than broad.                                   |
| 5. Breadth of fronto-nasal shields one-third of their length.                               | 5. Breadth of fronto-nasals one-half of their length.                    |
| 6. Each fin with a single nail.                                                             | 6. Each fin with 2 nails.                                                |

*Sub Gen. Chelonia imbricata*, (*Chelonées imbriques*) *Dum. and Bibr.*

Discal shields 13, imbricate; muzzle long, compressed; jaws with the edge straight, not toothed, at the extremity slightly recurved: each fin with 2 nails,

(2309) *CHELONIA IMBRICATA*, (Linne).

*SYN.*—La Tortue Caret, Dutertre.

Scaled Tortoise, Grew.

Caret, Labat, Fermin, Laccp, Bosc, Cuvier.

Testudo marina americana, Seba

Hawksbill Turtle, Brown, Catesby.

Testudo imbricata,  
Linne, apud.

Gmelin.

Pennant.

Donnd.

Schoepff.

Latreille.

Schneider.

Shaw.

Daudin.

Testudo caretta, Knorr.

La Tuilee, Daubenton.



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*Caretta imbricata*, Merrem, apud Gray : Catal.  
*Chelonia multiscutala*, Kuhl ?

*Chelonia imbricata*, { Prince Maxim.  
 Schweigger, apud. .... { Gray.  
                                           Dumeril and Bibron.  
                                           Prince Masignano.  
                                           Bell.

*Chelonee faux-caret*, Lesson.

*Chelonia caretta*, Temminck, and Schlegel.

"Kûra-kûra" of the Malays of Pinang.

Head brown, scales edged or rayed with yellow; shell yellow, marbled or rayed with rich brown; sternum yellowish white. In the young the areola of the sternal shields black.

*Habit.*—*Malayan Seas*. Atlantic and Indian Ocean.

The largest individual observed was of the following dimensions :

	Feet.	Inch.
Length of the head,....	0	4 $\frac{3}{8}$
Do. do. neck,....	0	3 $\frac{3}{8}$
Do. do. shell,....	1	7
Do. do. tail,....	0	2 $\frac{2}{8}$

*Sub-Gen. Caouana*, (*Caouanes*.) Dum. and Bibr.

Discal shields 15, not imbricate; jaws at the extremity slightly recurved.

(2310) *CHELONIA OLIVACEA*, Eschscholtz : Atlas.

*SYN.*—*Chelonia Caouana*, Var. B. Gray.

*Chelonia dussumierii*, Dum. and Bibr.

*Caouana olivacea*, Gray : Catal.

*Young.*—Above blackish olive, lighter than in the adult; shell and fins edged with pale yellow; sternum pale greenish yellow, washed with chestnut, areolæ blackish.

*Adult.*—Head brown; shell blackish green; some of the marginal scales of the fins yellow; sternum yellow, washed with chestnut; 27 marginal shields; fins with 1 nail.

*Habit.*—*Malayan Seas*. Bay of Bengal, Chinese Seas. This species is at Penang of rare occurrence. A single young individual observed was of the following dimensions :

Length of the head,.....	1 $\frac{7}{8}$	inch.
Do do neck,.....	1	
Do do shell,.....	6	
Do do tail,.....	0 $\frac{7}{8}$	

The shell is broad sub-cordiform, (its length exceeding its breadth by half an inch,) three keeled, the vertebral keel strongest, dentated behind; the marginal shields 27, obliquely placed. The 1st and 4th pair of costals, and the 4th vertebral shield each divided in two pieces.

In a not quite full-grown specimen, in the Museum of the Asiatic Society, the length of the shell is 2 feet 1 $\frac{3}{8}$  inch; its greatest breadth is 2 ft. 0 $\frac{4}{8}$  inch, the length exceeding the breadth by one inch. The vertebral shields are still slightly keeled. The 1st and 4th pair of costals, the 2d left costal, and the 4th vertebral are divided. The central part of the margin is slightly

upwards. The edges of the jaws are not toothed, but they are transparent with fine white vertical lines, which give them a fringed appearance.

The flesh of this, turtle, though relished by the Chinese settlers, is unpalatable to Europeans.

## SAURIA.

FAM. CROCODYLIDÆ, Bonaparte, (ASPIDIOTES, Dum. and Bibr.) *Sub. Gen Crocodilus*, apud Cuvier.

Muzzle oblong, depressed; teeth unequal, the 4th of the lower jaw fitting into lateral notches, and not into hollows of the upper jaw. Skull behind the eyes with two large holes, perceptible through the integuments. Hind-feet with an external dentated crest, and the toes palmated.

(2311) *CROCODYLUS VULGARIS*, Cuvier.—Var. B., Dum and Bibr.

*Crocodilus palustris*, Lesson.

*Crocodilus Vulgaris*, var. E. Gray.

*Crocodilus biporcatus raninus*, Muller, Tab. 3, Fig 7.

*Crocodilus palustris*, apud Gray : Catal.

"Buaya" of the Malays.

Muzzle a little widened, thick, transversally very slightly curved; head covered with angular rugosities; lateral margins of the skull not raised. Above greenish-olive, speckled with black; beneath yellowish or greenish-white.

*Habit.*—*Malayan Peninsula and Islands*. Java, Sumatra, Tenasserim; Bengal, Coromandel, Malabar.

It inhabits not only rivers and estuaries, but also the sea coasts, and may in calm weather be seen floating at a distance of two to three miles from the shore. Although numerous at Pinang and the opposite coast, it appears to be less so than *Crocodilus biporcatus*. Fishermen while working the nets are not seldom attacked by Crocodiles, and would, but for their presence of mind, oftener than they do, forfeit their lives. When seized, they force the fingers into the eyes of the Crocodile, which immediately lets go its victim, who is farther rescued by his comrades.—From 1842 to 1845 amputations from accidents of this description, were unfortunately of no rare occurrence in the General Hospital at Pinang.

Individuals, 15 feet in length are not uncommon; some attaining to 20 feet and upwards are reported to occur.—In rivers a single one will often appropriate to himself a limited district, which if it happens to be in the vicinity of a village, will soon be perceived in the loss of the grazing cattle. Instances of Malays, who, to avenge the loss of a relative, have watched the crocodile, and by diving from below, plunged a Kris into its heart, are on record. The eggs are white, the shell hard, of a cylindrical form, upwards of 3 inches in length, and about 1 $\frac{1}{2}$  inch

# REPTILES OF THE

(2312) *CROCODILLUS POROSUS*, Schneider.  
 SYN.—*Crocodili Ceylonici ex ovo prodiens*,  
 Seba.

Cr. biporcatus, Cuvier, { Tideman, Oppel,  
 apud ..... { Liboschitz,  
 { Merren.  
 { Bory de St. Vincent.  
 { Fitzinger.  
 { Lesson.  
 { Guerin.  
 { Wagler.  
 { Gray.

*Crocodilus biporcatus raninus*, Muller, Tab.  
 3. Fig 8.

*Crocodilus porosus*, Schn, apud Gray: Catal.  
 "Buaya" of the Malays.

Upper jaw surmounted by two rugged ridges,  
 each commencing from the anterior angle of the  
 eye; nuchal plates either none, or two very small.  
 Above yellowish green with large black oval spot;  
 keels of the dorsal scales green; beneath greenish  
 white.

*Habit.*—*Malayan Peninsula, Pinang, Singa-*  
*pore* India, Tenasserim, Sumatra, Java, Timor,  
 Seychelle Islands.

This, in the Malayan countries exceedingly  
 numerous species, is of the same habits, and at-  
 tains to the same size as the preceding.

FAM. GECKONIDÆ, Bonaparte, (ASCA-  
 LABOTES, Dum and Bibr.)

*Gen.* PLATYDACTYLUS, Cuvier.

Toes more or less dilated throughout their  
 length, beneath with transverse imbricate plates,  
 either entire or divided by a central longitudinal  
 groove.

(2313) *PLATYDACTYLUS LUGUBRIS*, Dum.  
 and Bibr.

Syn.—*Amydosaurus lugubris*, Gray.

Thumbs nailless; transverse plates beneath all  
 the toes; back finely granular. Above whitish,  
 with black spots.

*Habit.*—*Pinang. Otaheite.*

A single male was captured in my house in  
 the valley of Pinang.

The integuments correspond to the description  
 given by M.M. Duméril and Bibron, to which  
 may be added the following characters: The  
 skin is somewhat loose, forming a slight  
 longitudinal fold on each side of the body,  
 and on the anterior margin of the thigh. The  
 anus is covered by a transversal fold, reach-  
 ing across from the one thigh to the other.  
 There are no femoral pores. The tail is taper-  
 ing, much depressed, convex on the upper  
 surface, flat beneath, sharp at the sides. Near  
 the root, about  $\frac{2}{3}$  of an inch distant from the  
 anus, the skin forms an annular fold, completely  
 encircling that part of the tail. The colour slight-  
 ly differs from that of the Otaheite individuals.  
 The upper parts and the lower surface of the tail  
 from the annular fold are of a buff or pale dust

colour, so closely and minutely dotted with red-  
 dish brown, that the parts have a pale greyish  
 brown appearance. On the loins and between  
 the shoulders are a few distant blackish spots,  
 besides in the latter place appear two short lateral  
 lines, and an indistinct band proceeds from the  
 nostril across the eye to the shoulder. The  
 throat, inner side of the limbs, abdomen and the  
 lower surface of the root of the tail to the annu-  
 lar fold are buff-coloured. The pupil is black,  
 vertical, dentilated, the iris silvery, dotted with  
 reddish brown.

Length of the head. ...  $0\frac{1}{8}$  Inch.

Do. do trunk. ...  $1\frac{3}{8}$

Do. do tail. ...  $1\frac{3}{8}$

Entire length. ....  $3\frac{1}{8}$

(2314) *PLATYDACTYLUS GECKO*, (Linne.)

SYN.—*Salamandra Indica*, Bontius.

*Gekko ceilonicus*, Seba.

*Lacerta cauda tereti mediocri*, Linne mus  
 Adolph.

*Lacerta gekko* Linne.

*Gekko teres*.

*Gekko verticillatus*. } Laurenti

*Salamandre*, on gekko de Linneus, Knor.

*Stellio Gekko*, Schneider.

Common Gekko Shaw.

*Gekko guttatus*, Daudin, apud Gray.

*Lacerta guttata*, Hermann.

*Gekko verus*, Merrem, apud { Gray Zool. Jour.  
 { Gray. Catal.

*Gekko annulatus*, Kuhl.

*Gekko a gouttelettes*, Cuvier.

*Platydictylus guttatus*, Cuv, apud Guerin.  
 Dum, and Bibr.

"To-ke" of the Malays. [Note. The Malays  
 denominate the family of *Geckotidæ*: *Gekko*,  
*Keko*, *Gago*, *Goke*, evidently Onomatopoeias,  
 in imitation of the cry of these lizards.]

Above ash-coloured with numerous pale orange  
 spots; beneath yellowish white. Between the  
 scales of the back 12 longitudinal rows of large  
 distant tubercles, and six similar on the tail; the  
 latter with minute scales beneath.

*Habit.*—*Malayan Peninsula. Philippine Islands*,  
*Java, Tenasserim, Burmah, Bengal, Coromandel*  
*Coast.*

On the Malayan peninsula this species appears  
 to be less numerous than in the Tenasserim Pro-  
 vinces, where its shrill cry, "To-ke" is nightly  
 heard in houses. The male has two tubercular  
 scales on each side of the root of the tail. The  
 largest individual observed was of the following  
 dimensions:

Length of the head, ...  $1\frac{7}{8}$  Inch.

Do. do trunk, ...  $4\frac{3}{8}$

Do. do tail, .....  $4\frac{5}{8}$

Entire length, .....  $10\frac{3}{8}$

(2315) *PLATYDACTYLUS STENTOR*. N. S.

SYN.—"Toke" of the Malays.

Above light bluish grey with numerous irregu-  
 lar blackish spots, forming on the vertex an an-



# MALAYAN PENINSULA AND ISLANDS.

gle like an inverted V, and on the neck short oblique lateral bands. Beneath pearl-coloured. On the back and sides 10 longitudinal rows of large distant lenticular scales, and 6 similar on the tail; the latter with scutella beneath.

*Habit.*—*Pinang*.

In form and size this species closely resembles the preceding, from which it however differs in the following particulars. The oval nostrils are bordered in front by three scales, viz. the first upper-labial, a smaller rectangular, and a larger pentagonal scale, both of which latter are situated between the nostril and the rostral. Above the nostrils are surrounded by two smaller irregular triangular, and behind by a narrow crescent shaped scale. Of labial scales there are 14 above, 12 below. There are about 72 teeth in each jaw. The eye is very large; pupil black dentilated; iris silvery bluish grey. The ear is very large, obliquely oval without dentilations. The cheeks are much swollen. The scales of the back are small, rounded, hexagonal, becoming more rectangular on the sides. The rows of lenticular scales along the vertebra are smaller than the rest, but not so close as in *P. guttatus*. Behind the mental scale is a pair of large elongated scales, and 5 pentagonal larger appear on each side behind the lower labials. The gular scales are small, polygonal; the abdominal are rounded, hexagonal, not imbricate, and below the root of the tail become somewhat larger. The rest of the lower surface of the tail is covered with scutilla. Above the covering of the tail is like that of *P. guttatus*. On each side of the posterior margin of the cloaca are two very large tubercular-scales, and towards the centre two rather large postanal pores, covered by a loose fold of the skin. Fourteen femoral pores are placed on a slightly angular line. This species is also closely allied to *Platydictylus monarchus*, Schlegel, from which it however readily may be distinguished by the regular rows of lenticular dorsal scales, by its far greater size, and by its loud note. It is not numerous at Pinang. The only individual obtained, from the villa on the Pentland Hills, was a male of the following dimensions:

Length of the head,.....	2 $\frac{3}{8}$	Inch.
Do do trunk,.....	5 $\frac{4}{8}$	
Do do tail,.....	8 $\frac{3}{8}$	

Entire length,..... 1 ft. 4 inch.

(2316) *PLATYDICTYLUS MONARCHUS*, Schlegel, MS.

*SYN.*—*Platydictylus monarchus* Schl. apud Dum. and Bibr.

*Gecko monarchus*, Gray: Catal.

On the back, sides and limbs numerous conical tubercles irregularly scattered among the smaller flat polygonal scales; on the upper surface of the tail 6 to 13 transversal series of small spines; beneath scutell, a sometimes mixed with scuta. Chin with 2 larger oblong scales.

*New-born.*—Above brown, with the dorsal and caudal tubercles (no spines) white; the posterior part of the tail indistinctly white ringed; beneath uniformly paler brown.

*Adult.*—Above buff or ash-coloured or reddish brown, with 8 to 12 pairs of irregularly rounded, distant, dark brown spots along the spine; the head, limbs and sides with numerous more or less distinct, irregular dark brown spots; in some younger individuals the tail with whitish rings. Beneath yellowish white.

*Habit.*—*Malayan Peninsula, Pinang, Singapore, Philippine Islands, Amboyna, Borneo.*

The Malayan Geckonidæ have the power of somewhat changing the ground colour, none however in a greater degree than the present species. In the valley and on the hills of Pinang it is very numerous, swarming at night in rooms, on the walls, and under the ceiling, occasionally giving out a sound, resembling the monosyllable "Tok," repeated six or eight times with increased celerity. The aim of these lizards is by no means unerring; they frequently miss an insect, and fall from the ceiling. Among themselves they are pugnacious, when two or more covet an insect, the successful one has to defend its prize, or give it up to the stronger. The new-born (with umbilical aperture) and adult are of the following dimensions:

	<i>New-born.</i>	<i>Adult.</i>
Length of the head,.....	0 $\frac{3}{8}$	1 $\frac{3}{8}$ inch.
Do do trunk,.....	0 $\frac{5}{8}$	2 $\frac{3}{8}$
Do do tail,.....	1 $\frac{1}{8}$	3 $\frac{1}{8}$

Entire length, ..... 2  $\frac{1}{8}$  6  $\frac{5}{8}$  inch.

*Sub-Gen.* *PTYCHOZOOON*, Kuhl.

Toes webbed to the last compressed joint; thumbs nailless; sides of the head, body, limbs and tail with broad scaly membranes, those of the tail anteriorly scalloped. Male with femoral pores. On the sides scattered tubercles.

(2317) *PTYCHOZOOON HOMALOCEPHALUM*, (Creveld)

*Lacerta homalocephala*, Creveld.

*Gecko homalocephalus*, Tilesius.

*Ptychozoon homalocephalum*, { Fitzinger.  
Wagler.  
apud. Weigmann.

*Pteropleura horsfieldii*, Gray.

*Platydictylus homalocephalus*, Cuv. apud Dum. and Bibr.

*Ptychozoon homalocephala*, Kuhl, apud Gray: Catal.

*Head.*—The ground colour yellowish green olive. Between the eyes and muzzle a double figure, in whitish outline, representing in front a broad arrowhead, posteriorly united by a narrow stalk to a rectangular transversal band, situated in front of the eyes. On the vertex another larger figure, traced in whitish outline, rectangular in front, spreading like a four-rayed star over the occiput. A dark brown band proceeds

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from behind the eye, across the ear, to the shoulders, where it is lost in the general dark brown colour of the sides of the body. The superior margins of these two lateral bands are white proceeding backwards in zig-zag line, approaching each other over the shoulders, where they join the anterior black transversal line. The lips white. The membranes of the cheeks pale flesh-colour, with dark blue spots, and with the interstices between the scales pale lilac. The pupil vertical, dentilated; the iris rich golden brown.

**Back.** Of the same ground colour as the head, becoming dark reddish brown on the sides, relieved by 4 to 6 distant transversal black dotted lines, on the upper part of the form of the letter M, sending oblique, forwards pointed, lines on the sides. The upper part of the lateral membrane reddish brown; the interstices of the small rectangular scales purple.

**Tail and limbs.** Same ground-colour, as that of the head and back, with broad, distant, indistinctly whitish, transversal bands. On each elbow a whitish ring. Membranes of the tail, limbs and toes are yellowish grey with numerous minute spots of brown, purple, blue and red, which impart a purple, changing appearance to the general colour. The number of the indentations of the caudal membranes varies individually; the posterior part is entire, with waving surfaces.

**Lower parts.** Brownish white, with a few pale brown spots on the throat, inner side of the limbs, in the palms and soles. The tail and its membranes brownish.

**Habit.**—*Pinang Hills*, Singapore, Java, Ramree Island, (Arracan).

As correctly observed by M.M. Dumeril and Bibron, the scales of the female corresponding to those with the femoral pores of the male, have a slight, yet distinct, central depression. The female has a large tubercular scale on each side of the root of the tail, as well as the male. In colour and size the two sexes resemble each other. Two individuals were at different times captured in the villa occupied by Sir William Norris on the Great Hill of Pinang. When the lizard is at rest, the membranes of the cheeks, and the body are kept in close contact with these parts; in leaping those of the body are somewhat stretched out, and all the membranes together then act as a parachute. Also this lizard has in some degree the power of changing the ground colour from a darker to a lighter shade. The apex of the tongue is rounded with a small notch in the centre. A female while in my possession refused insects and water. She deposited a single egg, of a spherical form, about half an inch in diameter, soft, and of a yellowish white colour, which the following day she devoured. A male ate the integuments he had been

changing. The female was of the following dimensions :

Length of the head,....	1	inch.
Do do trunk,.....	2	$\frac{3}{8}$
Do do tail,.....	3	$\frac{5}{8}$

Entire length.  $7\frac{3}{8}$  inches.

In the Museum of the Asiatic Society is preserved a specimen of *Leptophis ornatus*, (Merrem,) in the act of devouring one of the present species. The serpent was captured in the Island of Ramree on the coast of Arracan.

(2318) *Gen.* HEMIDACTYLUS, Cuvier.

End of the toes widened into an oval disk, with a double series of transverse, imbricate plates beneath. From the middle of the disk rise the slender second and third nailed phalanx. A series of scuta beneath the tail.

(2319) HEMIDACTYLUS PERONII, Dum. and Bibr.

SYN.—*Hemidactylus leirus*, Gray.

*Peripia peronii*, Gray : Catal.

Under the chin a large triangular figure, composed of six elongated, towards the sides decreasing, scales; thumbs nailless; male with femoral pores; tail much depressed, very broad at the root, tapering towards the point, (sometimes with a small membrane on each side of the point,) with a series of scuta beneath; pupil vertical, shaped like two rhombs placed with the angles towards each other. [Note. Such is its appearance in the living animal, when the eye is exposed to the influence of light. M.M. Dumeril and Bibron note the pupil being "elliptical," which probably originates in their describing from preserved specimens, although my own in spirits of wine have retained the original form of the pupil.]

Above ash-coloured, labial scales whitish, each with a brown spot; beneath whitish. Iris silvery grey, spotted with brown.

**Habit.**—*Pinang*. Isle of France.

Of two individuals, captured at different times in my house in the valley of Pinang, the larger was of the following dimensions :

Length of the head, .....	0	$\frac{6}{8}$ inch.
Do. do trunk,.....	1	$\frac{5}{8}$
Do. do tail,.....	2	$\frac{3}{8}$

Entire length. ....  $4\frac{6}{8}$  inches.

(2320) HEMIDACTYLUS COCTÆI, Dum. and Bibr.

Thumbs well developed, nailed; [Note. Mr. Gray gives the present species as a Syn. of *Bolitania sublaevis*, Gray, (Catalogue, p. 158.) As the latter species is characterised as having the thumbs "clawless," it cannot be identical with *H. coctæi*,] back with minute granular scales; in some individuals with a few larger ones on the sides; tail broad at the root, tapering, a little depressed; with from 4 to 15 in



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distinct rings and 6 series of minute spines; beneath with scuta; chin with 4 larger scales; the central pair elongate pentagonal; male with 12 femoral pores; pupil as in *Hemidactylus peronii*.

Above ash-coloured, whitish beneath.

*Habit.*—*Pinang*. Bengal, Bombay.

Of two males observed in houses in the valley of *Pinang*, the larger was of the following dimensions:

Length of the head,..... $1\frac{1}{8}$  Inch.

Do. do. trunk,..... $2\frac{1}{8}$

Do. do. tail,..... $3\frac{1}{8}$

Entire length,.....7 inches.

(2321) *HEMIDACTYLUS FRENATUS*, Schlegel, MS.

SYN.—*Hemidactylus frenatus*, Schlegel, apud Dum. and Bibr.

*Hemidactylus lateralis*, ..  
*Hemidactylus quinquelineatus* } Gray: B.M.

Back with some larger granular scales; tail rounded, tapering above, with 6 series of small spines, scuta beneath; chin with 4 or 6 larger scales; ears very small; pupil as in the preceding species; thumbs very small, femoral pores 26 to 28, disposed on a slightly angular line.

*Young and Adult.*—Buff or ash-coloured, with or without brown spots; some with one or two brown lateral bands, commencing one above the other from the muzzle, interrupted or continued to the tail; the latter in some with distinct brown rings. Beneath whitish or buff.

*Habit.*—*Malayan Peninsula*, *Pinang*, *Singapore*. Amboyna, Timor, Java, Marianne Islands. Ceylon, Bengal.

Assam, [Note. Specimens in the Museum of the Asiatic Society.]—South Africa, Madagascar.

In the Malayan valleys and hills this small species is very numerous. It is of fierce habits, like several other *Geckonidae* destroying its own species. Its normal colour appears to be greyish, which it however has in its power to change. The largest individuals observed were of the following dimensions:

Length of the head,.....  $0\frac{1}{8}$  Inch.

Do. do. trunk,..... 2

Do. do. tail,..... 2

Entire length,.....  $4\frac{1}{8}$

(2322) *HEMIDACTYLUS PLATYURUS*, Schneider.

SYN.—*Stellio platyurus*, Schneider.

*Lacerta schneideriana*, Shaw.

*Gecko platyurus*, Merrem.

*Hemidactylus platyurus*, Wiegmann.

*Hemidactylus marginatus*, Cuvier apud {Wagler.  
Weigmann.  
Gray.

*Platyurus schneiderianus*, Gray: Catal.

Sides of the body and posterior margin of the thighs with a loose membrane; tail tapering, de-

pressed, with sharp, fringed margins, with scuta beneath; toes webbed half their length; chin with 4 pentagonal broad scales, placed in pairs, behind each other: 6 femoral pores placed on a continued line.

*Young and Adult.*—Above ash-coloured, in some with a greyish brown lateral band, from the muzzle continued to the tail; the latter with indistinct brownish transversal bands; others irregularly spotted and marbled with blackish brown; pupil and iris as in the preceding species. Whitish beneath.

*Habit.*—*Pinang*. Philippine Islands, Borneo, Java, Bengal, Assam. [Note. Specimens in the Museum of the Asiatic Society].

The individuals were observed in houses in the valley of *Pinang*. In a male the posterior half of the tail happens to be divided so as to appear double; one of the pieces, the continuation of the normal tail, is depressed, slightly fringed, and beneath with the row of scuta continued, the other is cylindrical, somewhat shorter, and above and below covered with minute scales. The largest individual was of the following dimensions:

Length of the head,.....  $0\frac{1}{8}$  Inch.

Do. do. trunk,....  $2\frac{1}{8}$  ..

Do. do. tail,....  $2\frac{1}{8}$  ..

Entire length,....  $4\frac{1}{8}$  ..

(2323) *Gen. GYMNODACTYLUS*, Spix.

Toes not widened into a disk, nor with denticulated margins; all five with non-retractile nails; fifth hind-toe versatile or capable of turning from the others under a right angle.

(2324) *GYMNODACTYLUS PULCHELLUS* (Gray)

SYN.—*Cyrtodactylus pulchellus*, Gray.

*Gonyodactylus pulchellus*, Wagler.

*Gymnodactylus pulchellus*, Dumeril and Bibr.

Head, back and limbs with numerous three sided tubercles among the smaller flat scales; sides of the body with a longitudinal fold of the skin; the anterior upper part of the cylindrical tail with distant rings of rounded, pointed tubercles; beneath a row of scuta. Chin with six scales, the centre pair elongated pentagonal. Males with 36 femoral pores on two not connected lines, between which, in front of the anus, a short narrow, longitudinal furrow. Both sexes with 3 or 4 tubercles obliquely situated on each side of the root of the tail.

*Young and Adult.*—Above rich brownish ochre; the nape of the neck and back with 6 broad transversal bands (the two anterior horse-shoe shaped), of a rich velvety mulberry, or snuff-colour with sulphur or chrome-yellow margins. The tail with 8 or 9 complete rings of similar colour, without the margins. Beneath: throat and belly whitish yellow, or pale brownish, each scale minutely dotted with brown. Pupil vertical,

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dentilated; iris golden, finely vermiculated with Van Dyke brown.

*Habit.*—*Pinang Hills*. Singapore.

In the male the two rows of femoral pores commence as two short parallel longitudinal limbs, separated from each other by a narrow short furrow, on the sides of which, (vertically), the first five femoral (preanal), pores are placed. In front of the anus the short vertical portions turn right and left under a nearly right angle, continuing the entire length of the thigh, each supporting 13 more femoral pores. The interval between the anus and the latter is partly occupied by a flat, slightly raised triangular space, covered by rather large, imbricate, rounded scales. In the female the two lines of larger scales carrying the femoral pores of the males, are present, each scale having a small shallow, round depression. The short, longitudinal furrow of the male is either wanting or barely distinguishable, but the triangular space with larger scales, in front of the anus, is present. The species appears to be rather numerous on the hills at Pinang, where the individuals obtained were captured in houses, at an elevation of 2,200 feet. The largest male was of the following dimensions:

Length of the head,.....  $1\frac{1}{8}$  inch.  
Do. do. trunk,..... 3  
Do. do. tail,.....  $5\frac{1}{8}$

Entire length... 10 inches.

Its habits offer nothing peculiar: it bites fiercely in defence. In captivity it refuses insects. The integuments, when about being renewed, are piecemeal torn off by the teeth, and devoured. A single egg deposited was of a spherical form, about half an inch in diameter, of a whitish yellow colour. M.M. Dumeril and Bibron assign Bengal as the habitat of this species. The specimens originally described by Mr. Gray, some in the Museum of the Asiatic Society, and a number in my own collection, all are from the hills of Prince of Wales Island (Pulo Pinang.) but no authenticated record exists of this species ever having been observed in Bengal. Another, widely different species of *Gymnodactylus* inhabits Bengal, as yet not published, and only known from three specimens, preserved in spirits in the Museum of the Asiatic Society, where they are marked *Gymnodactylus lunatus*, Blyth. One of these came from Midnapore, the others from Chyebassa. The species somewhat approaches to *G. fasciatus*, Dum. and Bibr. (*Cubina fasciata*, Gray.) The Museum possesses another nondescript species from Almorah, *Gymnodactylus nebulosus*, Blyth, MSS. allied to *G. marmoratus*, (Gray).

The plate of *Cyrtodactylus pmlchellus* in Gray's Illustrations of Indian Zoology is not taken from life, and gives a most inadequate idea of the physiognomy and beauty of the living animal. This should be observed, as M.M. Dumeril and Bibron praise the figure, which evidently has served as

original of their own description, and of copies introduced in illustrative works upon that order of animals.

FAM. VARANIDÆ. Bonaparte, (PLATYNOTES, Dum and Bibr.)

(2325) *Gen.* VARANUS, Merrem.

Scales set side by side, surrounded by an annular series of very minute tubercles; tail above more or less trenchant; on the throat a fold in front of the chest.

*Varani aquatici.*—Dum. and Bibr.

(2326) VARANUS NEBULOSUS, Dumeril and Bibron.

SYN.—*Tupinambis nebulosus*, Cuvier MSS.

*Monitor nebulosus*, Gray.

*Monitor nebulatus*, Schlegel.

*Varanus nebulosus*, apud, Gray: Catal.

Muzzle very elongated; nostrils obliquely cleft, situated half ways between the muzzle and the anterior angle of the eye; lips each with 50 scales; teeth compressed with sharp but not dentilated edges.

*Young*—Above. Ground-colour deep chocolate brown; the head largely marbled with greenish yellow; neck with indistinct obliquely converging gamboge lines; back, sides and limbs with gamboge spots, consisting of one to five scales, (those of the upper margins of the fingers forming continued lines;) sides of the anterior half of the tail, similarly coloured; the double row of scales covering the back of the tail gamboge; the posterior half deep chocolate with two distant (the second subterminal,) indistinct gamboge coloured rings.

Beneath. Ground colour pale chocolate. Chin, throat, chest and four limbs transversely undulated with greenish yellow; abdomen with short, interrupted, transversal yellow bands, consisting of from 4 to 12 scales; hind-limbs with larger similar spots; anterior half of the tail indistinctly marbled with yellowish green; posterior half like the upper surface. Pupil round; iris narrow, golden.

*Adult.*—Above brownish olive with yellow dots; anterior half of the tail yellow with minute square brown spots; posterior half brown and yellow-ringed; margins of the toes yellow. Beneath marbled and barred with brown and yellow.

*Habit.*—*Pinang*. Java, Siam, Bengal.

The only individual observed was a young male, captured in the hills at Pinang, of the following dimensions:

Length of the head,.....  $1\frac{1}{8}$  inch.  
Do. do. trunk,.....  $5\frac{1}{8}$   
Do. do. tail,.....  $9\frac{1}{8}$

Entire length,.... 16

(2327) VARANUS FLAVESCENS, (Gray)

*Monitor flavescens*, Gray.

*Monitor Hardwickii*, Gray, MSS.

*Varanus russellii*, Schlegel. MSS.

*Monitor exanthematicus*, Var. indica, Schlegel.

*Varanus picquotii*, Dum, and Bibr.

*Empagusia flavescens*, Gray: Catal.



Muzzle obtuse; nostrils oval, oblique, nearer the muzzle than the orbit; a series of supraorbital scales larger than the rest; scales of the back distant, bluntly keeled, of the tail and outside of the hind-limbs closer, sharply keeled; toes very short, nails yellow.

Above. Ground-colour light green olive with numerous distant, interrupted, transversal, yellow bands; temples, cheeks, and lips yellow. Beneath yellow; the throat with transversal pale brownish bands.

*Habit.*—*Pinang*. Bengal, Nipal.

A single male observed was of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	3
Do. do. trunk,.....	1	0 $\frac{5}{8}$
Do. do. tail,.....	1	6 $\frac{1}{8}$
<hr/>		<hr/>
Entire length,....	2	9 $\frac{5}{8}$

(2328) *VARANUS SALVATOR* (Laurenti.)

*Lacertus indicus*, Lochner?

*Lacerta mexicana*, Seba.

*Lacertus americanus*, "amphibius" *Tupinambis dictus*; Seba.

*Stellio salvator*, Laurenti.

Monitor Lizard, Shaw.

*Lacerta monitor*? Hermann.

*Tupinambis bivittatus*, Kuhl, apud Boie.

Monitor elegans, Gray.

Monitor à deux rubans, Cuvier.

*Hydrosaurus bivittatus*, Wagler.

Monitor vittatus, Lesson.

*Varanus bivittatus*, Dumeril and Bibron.

*Hydrosaurus salvator*, Gray, Catal.

"Beyawak" of the Malays of the Peninsula.

Head very elongated; nostrils oval, nearly transversal, close to the muzzle; a series of supraorbital scales, larger than the rest; teeth with dentilated edges; toes very long. Above. Ground colour dark brown or black; a band on the side of the neck from the shoulder to the eye, 5 to 7 distant, transversal series of separate rings, between which numerous spots or interrupted transversal lines, all yellow or yellowish white; the outside of the limbs and the tail spotted, the latter indistinctly banded with yellow. Beneath yellow, the throat with indistinct transversal black bands and minute spots; the sides of the body and limbs in some individuals with large blackish dentilations.

*Habit.*—*Malayan Peninsula*, *Pinang*. Philippine and Molucca Islands, Amboina, Java, Bengal.

This species is very numerous both in hilly and marshy localities. It is commonly during the day observed in the branches of trees overhanging rivers, preying upon birds and their eggs, and smaller lizards, and when disturbed, it throws itself from a considerable height into the water.—When attacked on level ground, it attempts its escape by running, if possible towards the water. Its quickness however is not so great as to prevent

a man from overtaking it, when it will courageously defend itself with teeth and claws and by strokes of the tail. The lowest castes of Hindoos, capture these lizards commonly by digging them out of their burrows on the banks of rivers, for the sake of their flesh, which by these people is greatly relished. Some individuals attain to nearly 7 feet in length, but the majority are smaller. A female examined was of the following dimensions:

	Feet.	Inch.
Length of the head .....	0	4 $\frac{3}{8}$
Do. do. trunk .....	1	3 $\frac{3}{8}$
Do. do. tail ... ..	2	8 $\frac{3}{8}$

Entire length,..... 4 4  $\frac{3}{8}$

FAM. IGUANIDÆ, Gray, (EUNOTES, *Dumeril and Bibron*.)

SUB-FAM. ACRODONTINÆ (ACRODONTES, *Dum. and Bibr.*)

(2329) *Gen. CALOTES*, Cuvier.

Head quadrangular pyramidal, more or less elongated, with small angular scales of nearly equal diameter. Occipital scale minute. Tongue thick, fungous, rounded, with the apex slightly notched. In the upper jaw 5 incisors and 2 canines. Nostrils lateral, pierced through a plate situated close to the muzzle. No transversal fold on the throat, sometimes with a large longitudinal fold on both sides. A gular pouch varying in size. A crest from the nape of the neck to the tail. Scales of the sides of the trunk homogeneous, imbricated in oblique series. No femoral pores.

*Sub-Gen. BRONCHOCELA*, Kaup.

Scales of the trunk in oblique series, inclined backwards, their points directed downwards. Posterior part of the sides of the head not swollen.

(2330) *BRONCHOCELA CRISTATELLA*, (Kuhl.)

*Lacerta mexicana strumosa*, &c. Seba, 89, 1.

*Agama cristatella*, Kuhl.

*Agama gutturosa* Merrem.

*Bronchocele cristatella*, Kaup, apud Dum. and Bibr.

*Agama moluccana*, Lesson, apud Schinz.

*Calotes gutturosa*, Guerin.

*Calotes cristatellus*, Schinz.

*Calotes gutturosus*, Weigmann.

"Gruning" of the Malays of the Peninsula.

Cervical crest (6 to 10 scales,) abruptly decreasing on the anterior part of the back; scales of the side of the trunk keeled, scarcely half the size of those of abdomen; behind the posterior angle of the orbit 3 to 5 flattened scales, pointing outwards, forming a minute longitudinal crest.

*Normal colours.* Beautiful grass-green, lighter beneath, entirely, or partially changeable to light grey, greyish olive, greenish brown, or blackish, sometimes with orange spots, or with indistinct black network; large isolated round spots on the head or back, or the lips, eyelids, or mar-

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gins round tympanum, momentarily black; sometimes with transversal distant brown bands, particularly on the tail. [Note. During life there is no trace of blue, or even bluish green about this lizard, but after death it sometimes acquires this colour from the effects of spirits of wine, to which circumstance must be attributed the denomination of "Blue Calotes," Gray, in Griffith's edition of Cuvier. Vol 9, p. 55.] Scales of the outside of the limbs and feet edged with brown. Pupil circular; iris brown with a narrow golden ring.

*Habit*.—*Malayan Peninsula, Pinang, Singapore.* Amboyna, Island of Buru, Java, Sumatra:

This species is very numerous in the Malayan countries both in the valleys and on the hills. It moves and leaps with great quickness among the branches of the trees. The most striking feature is the great power of suddenly changing its colours. The Malayan denomination of this species is "*Gruning*," which in Marsden's Dictionary is translated "a species of lizard, which changes its colour as it is affected by fear or anger; theameleon." No cameleon however appears to inhabit the Malayan countries, but the present lizard passes under that name among the European inhabitants. One of the largest males was of the following dimensions:

	Feet.	Inch.
Length of the head,...	0	1 $\frac{3}{8}$
Do. do. trunk,..	0	3 $\frac{5}{8}$
Do. do. tail,....	1	2 $\frac{5}{8}$
Entire length,...	1	7 $\frac{1}{8}$
Those of the intestinal canal:		
Small intestines, .....		3 $\frac{4}{8}$ inch.
Large, ,, .....		1 $\frac{1}{8}$
Cæcum, ,, .....		0 $\frac{4}{8}$

The stomach is cylindrical, simply a continuation of œsophagus without fundus, but separated from the small intestines by a valve. In several dissected it contained nothing but mucus. The length of œsophagus and the stomach together was 1  $\frac{4}{8}$  inch. The anterior part of the small intestines is widened till about a quarter of an inch from the pyloric valve, where ductus coledochus enters. Cæcum is very widened, more so than any other part of the canal, of a crescent shape.

(2331) *Gen.* LOPHYRUS, Dumeril.

Head triangular, more or less elongated, shelving in front; orbital edge arched or angular; nostrils lateral, circular, or oval; tongue papillary, rounded and very slightly notched at the point; in the upper jaw 5 incisors and 2 canines; tympanum superficial; skin of the throat lax, forming in some a scarcely perceptible, in others a highly developed pouch, and an angular cross fold in front of the chest; neck, trunk and tail compressed, with a crest, generally most elevated on the nape of the neck; scales of

the trunk rhombic, subimbricate, unequal, (with scattered larger scales); femoral pores none.

(2332) LOPHYRUS ARMATUS, (Gray).

*Agama armata*, Gray.

*Calotes tropidogaster*, Cuvier. [Note. By mistake: *Calotes lepidogaster*, Regne anim. 1829. T. ii. p. 39.]

*Acanthosaura armata*, Gray.

Orbital edge slightly angular, with a long spine at its posterior extremity; no spinous tubercles on the occiput; on each side of the nape of the neck, immediately above the ear, another long spine, surrounded with 5 to 6 shorter ones, at its base, from whence proceed obliquely over the temple and cheek a curved series of 18 larger polygonal, keeled scales; tympanum thick, circular; on the neck a crest of 8 to 12 long spines, surrounded with numerous smaller ones at the base; at a short interval the dorsal crest, the anterior 5 to 6 spines of which are very long, the rest rapidly decreasing towards the tail; gular pouch very small, not toothed, with scales of equal size; tail subtriangular, with a toothed crest above.

Above. Head chestnut; trunk and limbs blackish green, with a black transversal band in the interval between the cervical and dorsal crests, continued over the shoulders, with numerous pale yellowish white, black-edged, rounded spots, assuming the shape of transversal bands on the limbs and the tail; the larger single scales on the sides, limbs and tail clear sky-blue; from the orbit over the lip 5 to 6 radiating, black lines. Beneath yellowish white. Pupil circular, iris brown, with a narrow golden ring.

*Habit*.—*Pinang, Singapore.* Cochin China.

At Pinang, this species appears to be very local, and not numerous: two individuals examined were obtained from spice plantations in the valley. They were very active and fierce, possessed in a slight degree the power of changing the ground colour to a lighter hue, and in captivity refused food and water. In a female were found 13 eggs of a yellowish white colour, of an oval shape,  $\frac{5}{8}$  inches in length. The stomach contained fragments of leaves and twigs, and a quantity of earth and lime. The latter probably originated from the lime water, with which the spice-trees are copiously sprinkled, to secure them against the attack of insects. The dimensions of the lizard were:

Length of the head,.....	1 $\frac{1}{8}$ Inch.
Do. do. trunk,.....	3 $\frac{5}{8}$
Do. do. tail,.....	6

Entire length, ... 10  $\frac{1}{8}$

Of the intestinal canal:

Small intestines, ...	7 $\frac{4}{8}$ Inch.
Large, .....	1 $\frac{1}{8}$
Cæcum, .....	0 $\frac{4}{8}$

The stomach capacious, with thick parietes. The first portion of Duodenum is much widened



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till within half an inch from Pylorus, where Ductus coledochus enters. Cæcum is of a crescent-shape, much widened, as well as the large intestine.

## (2333) *Gen. DILOPHYRUS*, Gray.

Head four-sided. Forehead rather concave, face-ridge high. Eye brows rounded. Occiput with 3 or 4 larger tubercles on each side.

Parotids unarmed. Nape and back with a crest of high compressed scales, with series of smaller scales at their base. The throat rather lax. [Note. Add: *with a compressed pouch minutely toothed in front.*] with a cross fold behind, [Note. *Questionable*] extending up the front of the shoulders. Scales of the back small, rhombic, equal; of the belly rather larger, smooth. Tail compressed, keeled and toothed above, with 2 series of elongated keeled scales beneath. Femoral and preanal scales none.

## (2334) *DILOPHYRUS GRANDIS*, Gray. (Pl. XX).

*Habit.*—*Pinang Hills*. Rangoon.

As the only published characters of this species leave its identity with the Malayan somewhat doubtful, they are here preposed.

“*Olive green; sides white spotted, beneath whitish; tail black-banded; head with lines of rather larger scales; crest very high, formed of broad compressed close-set scales, with 3 or 4 series of scales on each side, of the base, interrupted over the shoulders.*” (Gray: *Catalogue of the Specimens of Lizards, &c* p. 239.)

*Form.*—The head is elongated, four-sided pyramidal, its greatest height and breadth being equal, and less than one half of the length. The muzzle is narrow, rounded, depressed. The upper surface of the head is very sloping, with a narrow furrow between the arched orbital parietes; the forehead depressed or concave. The scales are polygonal, keeled; those of the margin of the orbits and forehead larger, imbricate, forming a sharp ridge; four similar scales form a short ridge in the centre of the forehead, close to the muzzle. Behind the orbit, over tympanum, and on each side of the nape of the neck are similar short, oblique ridges, each composed of 5 larger pointed tubercular scales. The rostral shield is very broad, narrow, triangular; the mental, is much smaller, pointed, triangular, with two large polygonal scales on each side. The upper jaw is covered with 26, the lower with 24 elongated, narrow, rectangular scales.

### *Dentition.*

6	1—1	14-14	36.
Incis. —; Canin. —; Molar. —			
4	1—1	14-14	34.

The incisors and anterior molars are very small; the latter gradually increasing in size, flat, sharply edged, bluntly tricuspidate. The tongue is thick, flattened, very slightly notched in front,

the anterior half spongy, the posterior with large backwards pointed papillæ.

The nostrils are nearly circular, pierced, in a large oval scale, in front of which 3 scales intervene between the rostral. The eyes are large, sunk in the orbits, the pupil circular, black; the iris blue with golden spots and a narrow ring. The eyelids are covered with very minute polygonal, tubercular scales. Each tarsus with a double row of scales, the inner one of small, polygonal, tubercular; the outer one of rhombic, flat, with the angles overlapping, so as to give the free margin a toothed appearance. The tympanum is large circular. The skin of the throat is very lax, forming a compressed pouch, the anterior margin of which is slightly toothed, owing to the series of scales overlapping each other. But there is during life no trace of any “crossfold behind, extending up the front of the shoulders.” The scales of the neck and back are very minute, rhombic, or subrectangular, smooth, increasing in size and becoming imbricate on the sides, abdomen, limbs and throat. On the neck is a high arched, toothed crest, composed 26 large ensiform scales, the 13 anterior gradually increasing in length, the rest decreasing. The base of the crest is supported by two parallel, slightly arched series of rectangular scales, much larger than those of the rest of the body, but those of the upper series double the size of those of the inferior. The dorsal crest commences at a short interval a little behind the shoulders. In shape and component parts it resembles the former, but is double the extent, consisting of 45 scales, all of which however are inferior in height to those of the cervical crest, which, as well as the somewhat lower, sloping level, renders the dorsal crest less conspicuous than the former. The skin is somewhat lax on the sides of the body, leaving the ribs visible. The tail is very much compressed, attenuated elongated. Its sides are covered with rather large, smooth imbricate, rhombic scales. The anterior third of the upper margin is toothed, composed of a single row of large, gradually decreasing, sharply keeled scales. The other two thirds are covered by two rows of keeled scales, thus giving the posterior part of the tail a bidentated appearance. The lower surface of the tail is covered by two series of large, gradually decreasing, imbricate, keeled scales, giving it a bidentated appearance. The limbs are slender; the anterior little more than half the length of the posterior, and the toes very short. The posterior 4th toe is excessively long. The palms and soles are covered with minute, pointed, rough scales; the toes above and beneath with sharply keeled, imbricate, rhombic scales. The claws are large, trenchant, curved.

*Colours.*—The ground-colour of the head, neck, throat, gular pouch, and the chest is impure gamboge, the scales edged with brown. The eyelids dark brown, the tarsi buff. A dark

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blue triangular streak proceeds from the anterior angle of the orbit to the nostril; another is placed parallel with the upper labial scales, which as well as the lower are of a pale blue, as also the tympanum. From the labial scales and tympanum on each side across the throat, the pouch, and the sides of the neck, proceed 7 oblique, undulating, dark blue bands. The tympanum is enclosed by two oblique broad, purple-brown bands, which join each other under an angle at the anterior extremity of the cervical crest, where a third broad, longitudinal purple-brown band commences, proceeding over the side of the neck, then expanding, covers the back and the upper half of the sides of the body, where its lower margin describes two large curves. The lower part of the sides are of a deep lilac, changing on the abdomen to bluish white. On the sides of the body and on the abdomen appear several oblique series of lozenge-shaped spots: a few on the brown portion of the sides of a deep Indian red, the rest bright gamboge. The cervical and dorsal crests are mulberry-brown; the former with the upper half of each of the first 13 scales light-green; the latter with the upper half of the first 10 scales pale yellow. The scales at the base of the crests partake of the general colour, but many of them have a pale yellow spot. The tail is above and beneath with alternate broad rings of impure white, the scales edged with brown, and purple-brown, changing to black on the posterior half. The legs, feet and toes are dark purple-brown with indistinct transversal yellowish bands.

Dimensions.	Foot.	Inch.
Length of the head,...	0	2
Do do trunk, .	0	4 $\frac{1}{8}$
Do do tail,....	1	4

Entire length...1 ft. 10 $\frac{1}{8}$  in.

Length of the cervical crest, 1 $\frac{7}{8}$ inch;	Height of 13th scale,.... 0 $\frac{1}{8}$ inch.
Do do dorsal crest,..... 3 inch;	Do do 15th scale... .. 0 $\frac{1}{8}$
Length of humerus,..... 1 inch;	Of femur, ..... 1 $\frac{7}{8}$ inch.
Do do forearm, 1 $\frac{1}{2}$	Of tibia,..... 2
Do do hand and 4th toe,..... 1	Of foot and 4th toe..... 2 $\frac{1}{8}$

Entire Length,... 3 $\frac{1}{8}$  inch. 6 inch.

The only individual examined, was captured on a botanical excursion by Sir William Norris on the Pinang Hills, on the bank of a mountain stream, at an elevation of about 2,000 feet. It appeared slow in its movements, of general sluggish habits, showed no power of changing colours, and in confinement it refused insects, vegetable food, as well as water. After having been preserved in rectified spirits of wine for upwards of 3 years, the specimen has retained the original brown and white colours and the Indian red spot; but the yellow, light-green and light-blue have

changed to whitish, and the dark blue marks to blackish.

Although the colours in this state do not agree with those given by Mr. Gray, apparently though not stated, taken from a preserved specimen, the peculiar distribution of the markings correspond, and induce me to believe in the identity of the animals.

(2335) *Gen. DRACO*, Linne, apud Dumeril and Bibron.

Head triangular, obtuse in front, slightly depressed, covered with small scales of unequal diameter.

Three or four incisors and 2 canines in the upper jaw. Tongue spongy, thick, rounded, entire. [Note.—In the following species the tongue is minutely, yet distinctly *notched*] Tympanum hidden (i. e. *Dracunculus*, Weigmann.) in some, visible in others. In the centre of the throat an elongated vertical pouch; on each side a smaller horizontal. In general a small cervical crest. [The female of *Draco fimbriatus*, Kuhl, (i. e. *Draco abbreviatus*, Gray,) *D. volans* and *D. maculatus* differs from the male in having no cervical crest, and in having a smaller, less elongated gular pouch.] Trunk depressed, with a lateral membrane, supported by the spurious ribs. No femoral pores. Tail very long, thin, angular, lightly depressed at the root.

*A. Tympanum visible, metallic iridescent.*

(2336) *DRACO VOLANS*, Linne.

*Draco volans* apud Gmel., Latr., Gray.

*Draco Præpos*, Linné, apud Gmelin.

*Draco major*, Laurenti.

*Draco minor*, Laurenti.

Le Dragon, Daubenton, Laccpede, Bonnat.

Flying Draco, Shaw.

*Draco viridis*, Daudin, apud Merr., Kuhl, Wolf, Wagler.

*Draco fuscus*, Daudin, apud Merr., Kuhl.

*Draco bouroumiensis*, Lesson?

*Draco daudinii*, Dumeril and Bibron.

"Chichak terbang" or "Kubin" of the Malays.

Scales of the back rhomboidal, imbricate, indistinctly keeled; of the throat granular, of equal size; the adult male with a small cervical crest; tongue minutely notched in front; gular pouch of the male very long, narrow, nearly double the length of the head; of the female shorter, broad triangular.

*Adult male and female.* Head metallic brown or green, with a black spot between the eyes. Back and inner half of the wing-membrane varied with metallic, iridescent dark brown and rose-colour, in some disposed in alternate transversal bands, with numerous black spots and short irregular waved or zigzag lines. Limbs and tail in some with rose-coloured transversal bands. Sides of the neck and lips also rose coloured with black spots. Cheeks and eyelids silvery-white or sky-blue, the latter with short radiating black lines. Throat and gular pouch bright



yellow, the former dotted with black; lateral pouches yellow or silvery rose, dotted with black. Outer half of the wing membrane black with indistinct transversal bands, composed of large, sometimes confluent, spots of silvery rose or whitish colour; the margins appearing as minutely fringed with silver. Beneath either whitish yellow or pale sky blue with metallic lustre; the membrane largely, the abdomen in some minutely spotted with black or brown. Iris hazel, with a golden narrow ring. *Young* of the same more vivid colours, with a series of double black spots along the spine of the back, and some scattered on the sides.

*Habit.*—*Malayan Peninsula, Pinang.* Philippine Islands. Borneo, Java.

The transcendent beauty of the individually varying colours, baffles description. Such as are current of this and other species, appear to have been taken from preserved specimens. As the lizard lies in shade along the trunk of a tree, its colours at a distance appear like a mixture of brown and grey, and render it scarcely distinguishable from the bark. Thus it remains with no signs of life except the restless eyes, watching passing insects, which, suddenly expanding the wings, it seizes with a sometimes considerable, unerring leap. It is but on close inspection, exposed to the light or in the sun that the matchless brilliancy of its colours appears. But the lizard itself appears to possess no power of changing them. This species is numerous on trees, in valleys and hills. The female, apparently less numerous than the male, carries 3 to 4 eggs of an oval cylindrical shape,  $\frac{3}{8}$  of an inch in length, and of a yellowish white colour.—Of a number examined none exceeded the following dimensions:

Length of the head,..... $\frac{7}{8}$ . 0 $\frac{1}{2}$  Inch.

Do. do trunk, ... .. 2 $\frac{1}{2}$

Do. do. tail,... .. 4 $\frac{1}{2}$

—  
7 $\frac{1}{2}$

B.—*Tympanum hidden by scales* (DRACUNCULUS, *Weigmann*).

(2337) DRACO MACULATUS, Gray.

Syn.—*Dracunculus maculatus*, Gray.\*

\* *Note.* ["Grey, black-spotted; wings black-spotted; throat grey; pouch of the male elongate; scales of the back rather unequal, rhombic, keeled; of the sides rather smaller; sides with a series of large keeled scales; ears rather sunk, with unequal flat scales; tail slender, with a central keel above, and 5 more small ones on the sides, base dilated, with 5 nearly equidistant equal keels above."—*Catalogue of the Specimens of Lizards, &c.*, p. 236]

*Habit.*—*Pinang.* Tenasserim.

*Form.*—This species closely resembles *Dracolineatus*, Daudin, (*Dracunculus lineatus*, *Wiegmann*), from which it differs in the following particulars. The adult male carries

a very elongated, pointed gular pouch, double the length of the head, and a slightly elevated cervical crest, consisting of 6 to 8 pointed tubercular scales, and continued along the anterior half of the back in the shape of a ridge composed of a raised fold of the skin. The *female* has neither cervical crest nor dorsal ridge, and her gular pouch is much reduced, its length being about one half of the length of the head. Both sexes have the following characters in common. From each side of the neck commences a series of spinous scales, sometimes close together on one side, distant on the other, which, increasing in size and becoming more distant, continue along the side of the body, where they deviate outwards, marking the origin of the wings, and again converge towards the root of the tail, where they terminate. The scales of the back are generally smooth, consisting of smaller polygonal, mixed with some larger rhombic, indistinctly keeled, imbricate scales. In some individuals the latter are disposed so as to form a series on each side of the dorsal spine. The supra-orbital margin has from 3 to 4 large pointed tubercles, of which but the one situated at the posterior angle appears to be constant. The scales of the neck and throat are small granular, from which those covering the tympanum differ by being larger, flattened and polygonal. The tubercles of the throat and neck, and many of the scales of the back, wing membranes, and the limbs, have each a minute rounded cavity at the point, discernible by a lens. The pouches, chest and abdomen are covered with rhombic, imbricate, keeled scales without apical cavities. Each jaw has 16 labial scales. The tail long, very broad at the base, particularly in the male, suddenly tapering, rounded above, and covered with strongly keeled, imbricate, rhombic scales. The first large ones of the lowest series of the root form a more or less conspicuous toothed crest. The lower surface is flattened, with scales like the upper. The apex of the tongue is notched.

*Dentition.*

4	1—1	15.—15
Incis.—	Canin. ———	Molar ———
2	1—1	15.—15

*Colours.*—This species bears so close a resemblance to *Draco volans*, that it is scarcely possible to point out any difference. The upper parts of the body are metallic greenish-brown, varied with golden rose-colour or isabella, indistinctly dotted and lined with black. The wings are golden isabella with transversal black bands, formed by series of black rounded spots, either separate or confluent on the inner half, but blending into one another on the outer-half. In some individuals numerous undulating golden rose-coloured or buff lines longitudinally intersect the bands. The margins are finely fringed with silver. The limbs and tail are indistinctly ringed with black or brown. A black spot on the vertex, between the eyes, appears to

be constant also in this species. The gular pouch and the throat are bright yellow, the latter in some dotted with pale brown. The chest and abdomen whitish yellow in some, bluish white in others. The under surface of the wings is of the latter colour, in some with single large rounded black spots near the margins, independent of the upper markings, which may be distinguished through the hemitransparent membrane.

Of this species but four, of which 2 males were received from Sir Wm. Norris. They were all from the Hills of Pinang; [Note. The Museum of the Asiatic Society possesses two females, obtained by the late Dr. Spry in the Tenasserim Provinces.] none exceeded the following dimensions:

Length of the head,.....  $0\frac{5}{8}$  inch.  
Do do trunk,..... 3  
Do do tail,.....  $5\frac{2}{3}$

—  
 $8\frac{7}{8}$  inches.

The intestinal canal of a female measured:

Small intestines,..... 3 inches  
Large „ .....  $0\frac{7}{8}$   
Cæcum „ .....  $0\frac{2}{3}$

The capacious stomach contained remains of insects, particularly of the gigantic black ant, inhabiting the Malayan hill forests. The first portion of Duodenum is much widened till within a quarter of an inch from Pylorus, where Ductus coledochus enters. Coecum is of a short crescent shape, much widened as well as the large intestine. In the abdominal cavity appeared 5 eggs, of an oval form, yellowish white colour, each half an inch in length.

(2338) *Gen. LEIOLEPIS, Cuvier, apud Dumeril and Bibron.*

Head sub-pyramidal quadrangular with minute polygonal, tubercular scales. Tympanic membrane a little sunk. Tongue scaly on the anterior, papillary on the posterior half, apex bifid. Chest with a transversal fold in front. Two canines in each jaw. Trunk sub-cylindrical with granular scales above; beneath with larger, smooth, imbricate, rectangular scales. Femoral pores. Tail conical, very long; the root broad and depressed, the rest excessively slender.

To these characters it will be necessary to add: *Skin of the side of the trunk excessively lax, capable of being expanded into a large wing-like membrane by means of the six anterior, very long, spurious ribs.*

(2339) *LEIOLEPIS BELLII (Gray.)*

SYN.—*Uromastix bellii*. Gray

*Uromastix belliana*, Ill Ind Zool\*

*Leiolepis guttatus*, Cuvier, apud { Guerin.  
Dumeril  
& Bibron.

*Cynosaurus punctatus*, Schlegel.

*Leiolepis bellii*, Gray. Catal.

[Note. In the supposition that this incorrectly drawn and coloured figure has been taken

from the living animal, M.M. Dumeril and Bibron have been led to publish an erroneous description and figure. The last description of this species of Mr. Gray appears to be founded on the same authority. It runs thus: "Olive with black edged white spots and a black edged white streak on each side, beneath whitish." *Catal. &c.*, p. 263.]

Ground colour, above blackish-grey; the back and sides with 7 parallel lines of pale sulphur colour, edged with black, the 2nd from below, the 4th and 6th composed of more or less confluent spots, the other 3 of distant round spots. The expanded membrane black with 7 or 8 broad distant, transversal bars of a brilliant orange. The tail above with numerous small pale yellow spots. The forelegs with orange coloured rounded spots, some of which tipped with azure; the hindlegs minutely spotted with yellow. The throat pale azure; abdomen pale orange, marbled with broad bluish black veins; the tail beneath pale yellowish white. The lower eyelid is pure white; pupil circular, iris hazel with a narrow golden ring.

*Habit.*—*Malayan Peninsula, Pinang. Cochinchina.*

The head is covered with small elongated polygonal keeled scales; the upper jaw with 26, the lower with 18 to 20. The mental shield is elongated polygonal; the upper part of the sides is joined to the first lower labial scales; the centre part is on each side in contact with the first of series of 13 to 15 elongated polygonal scales, which follow the tract of the labial, between which there is a narrow intervening space covered with smooth polygonal scales, larger than those of the rest of the throat. The back and wing membranes are covered with minute granular scales, the abdomen with larger smooth rhombic scales. Those of the tail above and beneath are verticillated, rectangular subimbricate, and strongly keeled. The tongue is thick, fungous, not scaly as incorrectly represented, with the tip much flattened, free and slightly extensile, divided in two laterally compressed sharp points.

The molar teeth are tricuspidate, increasing in size, the anterior being the smallest. In the adult they are much worn and incrustated with brown tartar, like the teeth of *Semnopithecus* and *Ruminantia*.

*Dentition.*

4 1—1, 12-12  
Incis —; Canin, —; Molar —,  
1—1 1—1 11-11

The nails are long, lightly arched, of a pale yellowish horn-colour. The wing membrane in a state of repose appears like a longitudinal loose fold, extending along each side from the axilla to the inguinal region. Expanded the external margin becomes arched, the trunk and the membranes forming a greatly flattened oval disk,



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strongly contrasting with the bulky appearance of the parts in a state of repose,) resembling the hood of *Naja*. The transversal diameter of the disk across axilla and the inguinal region is  $1\frac{1}{8}$  inches; across the centre  $2\frac{3}{8}$  inches. Like the mechanism of the Genus *Draco*, the membranes are expanded by means of the very long six anterior pairs of spurious ribs, which the lizard has the power of moving forward under a right angle with the vertebral column. The six posterior ones are excessively short, and though equally moveable, do not appear materially to assist in expanding the membranes. The latter are used as a parachute in leaping from branch to branch, after which they immediately resume their state of repose. Sudden fear, or anger will also cause a momentary expansion. The femoral pores are situated on a series of rather large rhombic scales on each thigh. In a number of twelve adult individuals the pores varied from 13 to 19 on each thigh. In the specimens in the Paris Museum, described by M.M. Dumeril and Bibron, there are from 20 to 24 on each thigh.

This species appears to be numerous, but local. Twelve were at one time obtained from a spice plantation in Province Wellesley, some of which were in the act of changing the integuments. They were very active and swift, more so than their rather heavy make would induce to believe, and they would bite and scratch when handled, although among themselves in a spacious cage, they appeared peaceable, and patiently submitted to being trodden, or run over by a neighbour, about ascending the perch. The Malay, who brought the lizards, asserted they were frugivorous, and might be fed with soft fruit and boiled rice, which was perfectly true. In one immediately examined, the stomach and intestines contained rounded seeds of various kinds from the smallest size to that of a large pea, and vegetable fibres. [Note. The latter, however, as well as sand and fragments of stones, also occur in carnivorous and insectivorous lizards, as well as serpents, which swallow these substances to stimulate digestion.]

The rest refused insects and different kinds of fruit, but during the several month's confinement each would daily eat a little boiled rice, and occasionally take water. Of these none exceeded the following dimensions.

	Ft.	Inch.
Length of the head,....	0	$1\frac{1}{8}$
Do. do trunk,...	0	$4\frac{2}{8}$
Do. do tail,.....	1	0

Entire length,....	1 foot $5\frac{3}{8}$ Inch.
Length of the intestinal canal:	
Small intestines,....	$5\frac{5}{8}$ Inch.
Large do. ....	3
Cæcum,.....	$0\frac{2}{8}$

The stomach is of a lengthened pyriform shape, one inch in length; Duodenum, narrow,

receives Ductus coledochus at  $\frac{3}{8}$  inch distance from Pylorus.—Cæcum is very short, nearly circular. The large intestine is sacculated, terminating in a short simple rectum.

(2340) *LEIOLEPIS REVESII*.

There seems to be reason to believe that *Leiolepis revesii* \* Gray, inhabiting "China" and Arracan, is also found on the Malayan Peninsula.

\* [Note. Syn.—*Uromastix revesii*, Gray.—"Olive with a series of bright red spots on each side." (Griffith: Animal Kingdom, IX p. 62.) Such was the only account of this species at the time of the publication of *Herpétologie Générale*, where it is not introduced. Mr. Gray's latest description runs thus: "Olive with longitudinal series of pale whitish spots; when alive blackish, with orange spots on the back, and a series of bright red spots on the sides.—China." (Catalogue &c. p. 263).

The Museum of the Asiatic Society possesses an adult male and a young specimen, sent from Arracan by Capt. Phayre. The form resembles in every particular that of *Leiolepis guttatus*, from which the present species principally differs by its colours, larger heavier make and size. Each jaw is covered by 20 scales. From the mental scale proceeds a series of 10 larger scales on each side below the labial. On the throat appear 2 or 3 strong transversal folds, of which the anterior commences from the posterior margin of the tympanum. The tail is covered with keeled verticillate scales as in *L. guttatus* but not with "rings of smooth scales" as Mr. Gray's generic character states.

## Dentition.

Incis.  $\frac{4}{1-1}$ ; Canin.  $\frac{1-1}{1-1}$ ; Molar.  $\frac{10-10}{10-10}$ ; Femoral pores 20.

	Ft.	Inch.
Length of the head,.....	0	$1\frac{1}{8}$
Do do trunk,.....	0	$6\frac{1}{8}$
Do do tail,.....	1	0

Entire length... 1  $7\frac{5}{8}$  inch.

FAM. SCINCIDÆ, Gray, (LEPIDOSAURES, *Duméril and Bibron*.)

SUB-FAM. SAUROPHTHALMINÆ, *Cocteau*.

(2341) Gen. GONGYLUS, *Wagler, apud Dumeril and Bibron*.

Nostrils lateral, pierced either through the nasal or between the nasal and rostral shield; tongue notched, squamous; teeth conical, often slightly compressed, and as it were wedge-shaped, simple; palate toothed or not, with a posterior notch or a longitudinal groove; auricular apertures; four feet, each with 5 unequal, slightly compressed, not dentilated, nailed toes; sides rounded; tail conical or slightly compressed, pointed.

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(2342) *Sub-Gen. EUMECES, Weigmann.*

Nostrils pierced through the nasal shield, near the posterior margin; supernasal shields; palate not toothed, with a rather shallow triangular notch behind; scales smooth.

(2343) *EUMECES PUNCTATUS, (Linne.) Var.*

*Lacerta punctata*, Linne.  
*Stellio punctatus*, Laurenti.  
*La-Double raie*, Daub. apud Lacep, Bonnat.  
*Lacerta interpunctata*, { Daudin.  
 Gmelin, apud Shaw.  
 Latreille.  
*Scincus bilineatus*, Daudin.  
*Scincus punctatus* Schneider, apud Merrem.  
*Seps scincoides*, Cuv. apud Griffith, A. K.  
*Lygosoma punctata*, Gray, apud Griff. A. K.  
*Riopa punctata*, Gray.  
*Tiliqua cuvierii*, Cocteau.  
*Tiliqua duvaucellii*, Cocteau.  
*Eumeces punctatus*, Weigmann, apud Dum and Bibr.  
*Riopa hardwickii*, Gray: Catal, (Young.)

Trunk individually varying in length; limbs very small, giving the lizard a blindworm-like appearance; tail very thick at the root, fusiform, tapering to a very sharp point, its length varying from one to two-thirds of the entire length of the animal. On the anterior margin of the ear a small tubercle. Above metallic chestnut, or greenish bronze, in some with 6 or more or less distinct, dotted, black lines along the back, or with the two rows of scales nearest each side of a lighter shade than the ground colour, thus forming two lighter longitudinal bands. From the nostril to the middle of the side of the tail a black or brown band, with numerous small white spots on the sides. Limbs outside dotted with white. Beneath sulphur-coloured, in some the throat and tail minutely dotted with black. Iris dark brown, with a narrow, circular, golden ring.

*Habit.*—*Malayan Peninsula, Pinang, Singapore.* Malabar and Coromandel Coast, Bengal.

The variety described above, is numerous in the Malayan countries, both on hills and in valleys. Of several the largest individual was of the following dimensions:

Length of the head,.....	0 <sup>3</sup> / <sub>8</sub> Inch.
Do. do. trunk.....	2 <sup>1</sup> / <sub>8</sub>
Do. do. tail.....	1 <sup>7</sup> / <sub>8</sub>
Entire length,.....	4 <sup>3</sup> / <sub>8</sub>

(2344) *Sub-Gen. EUPREPIS, Wagler.*

Nostrils pierced through the posterior part of the nasal shield; two super-nasal; palate with a more or less deep triangular incision; pterygoid teeth; scales keeled.

(2345) *EUPREPIS RUFESCENS, (Shaw.)*

*Lacerta maritima maxima*, &c. Seba II, Tab 105, Fig. 3.

*Lacerta rufescens*, Shaw, III, P. 1, P. 258.

*Scincus rufescens*, Mer- { Cuvier.  
 rem, apud. Gray in Griffith,  
 A. K.

*Scincus multifasciatus*, Kuhl.  
*Mabouya multifasciata* Fitzinger.  
*Euprepis multifasciatus*, Wagler.  
*Tiliqua rufescens*, Gray.  
*Eumeces rufescens*, Weigmann.  
*Tiliqua carinata*, Gray.  
*Tiliqua affinis*, Gray, (Young).  
*Euprepes sebæ*, Dumeril at Bibron.

Body strong; limbs proportionate; tail rounded, slightly compressed, little exceeding half the entire length. Scales of the back and sides: in the young with 5 to 7 keels; in the adult the dorsal scales with 3 to 5 keels, the rest smooth. The anterior margin of the ear with 3 or 4 minute lobules. Lower eyelid with a series of 4 or 5 larger, square scales. Pterygoid teeth minute, few, hid in the palatal membrane, forming a short line on each side of the triangular incision of the palate.

*Habit.*—Sandwich-Islands, Philippines, Timor, Celebes, Borneo, Java, Coromandel, Bengal.

VAR. D. Dumeril and Bibron.

Above. Ground colour shining bronze with 5 to 7 zigzag, or dotted black lines, in some continued on the tail; sides with many of the scales black, with a square white spot in the middle, in some arranged so as to produce numerous, distant, transversal bands. The margins of some or all the shields of the head black. Beneath sulphur coloured. Iris black with a golden circular ring.

*Habit.*—*Malayan Peninsula, Pinang, Singapore.*

VAR. E., Dumeril and Bibron.

Above uniformly shining bronze; sides in some sprinkled with blood red; rest like the preceding.

*Habit.*—*Same localities.*

VAR. F., Dumeril and Bibron.

Above uniformly shining bronze; the anterior half of the sides with a broad blood-red stripe, which in specimens preserved in spirits of wine changes to whitish, or disappears; the posterior part of the sides of the body and the anterior of the tail in some with square skyblue spots in the middle of some of the scales; rest like the preceding.

*Habit.*—*Same localities.*

These three varieties are exceedingly numerous in the hills and valleys of the Malayan countries. They may be seen basking in the sun, in bamboo hedges, or on trees, and they fearlessly enter houses in pursuit of insects, in which they display great agility. The female deposits 6 to 12 yellow white, oval, cylindrical eggs, half an inch in length. Nearly all have on the lower two-thirds of the tail a series of large scuta. In one individual observed the last two-thirds of the



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back of the tail was covered with a single series of very broad scales, of which each of the anterior had 15 to 16 keels. In another the tail had been lost near the root, and reproduced by a pyramidal, soft, naked process,  $\frac{3}{8}$  inch long, with circular folds like those of the body of *Ichthyophis*.—*Var. F.* appears to exceed the others in size: the largest was of the following dimensions:

Length of the head,.....  $0\frac{5}{8}$  Inch  
Do. do. trunk,.....  $3\frac{4}{8}$   
Do. do. tail,.....  $4\frac{4}{8}$

Entire length:  $8\frac{5}{8}$  Inches.

(2346) *EUPREPIS ERNESTII*, Dumeril and Bibron.

*Scincus ernestii*, Boie, MSS.

*Psammite de Van Ernest*, Cocteau.

*Dasia olivacea*, Gray: Catal.

Form like *E. rufescens*. Triangular incision of the palate very small, with a few minute pterygoid teeth on each side. Ears obliquely oval, small, appearing more so being half covered by two of the temporal scales; no lobules on the anterior margin. Scales of the back with minute longitudinally waved lines and from 3 to 8 indistinct keels. The outer half of the toes and the nails sharply compressed. A series of scuta beneath the tail.

*Very young*.—Head light green bronze, shields edged with black and a black line, edged with silver, from the muzzle to the ear. Back, sides, root of the tail and outside of the limbs shining black with numerous transversal, waved, silvery lines. Feet and toes rose, or flesh coloured. Tail brilliant scarlet. [Note. The very young of *Eumeces lessoni*. Dum, and Bibr, (*Scincus cyanurus*, Lesson,) is distinguished by a similar distribution of colours.] Throat, abdomen and inside of the limbs silvery white.

*Adult*—Ground colour greyish-brown bronze. Frontal and supraorbital shields black edged; fronto-parietals, inter-parietals, and parietals black, each with a whitish elongated mark, united, forming a symmetrical figure. From the nostril to the eye a black streak. Neck and body with a number (12 to 14) of distant, transversal, waved bands, composed of black scales, each with a rectangular white spot in the middle. Outside of limbs with 4 or 5 similar bands. In some a buff coloured lateral band on the posterior part of the back, and the anterior half of the side of the tail. Beneath iridescent light bluish-green; scales with whitish edges. Iris black with a golden narrow circle.

*Habit*.—*Malayan Peninsula, Pinang. Java.*

In habits this species resembles *Euprepes rufescens*, but appears to be far less numerous. In a female were found eleven eggs, in shape, size and colours resembling those of *E. rufescens*.

The young above described, was of the following dimensions:

Length of the head,.....  $0\frac{3}{8}$  Inch.  
Do do trunk,..... 1  
Do do tail,... ..  $1\frac{4}{8}$

Entire length...  $3\frac{1}{8}$  Inch.

Of the two adult individuals the large measured:

Length of the head,.....  $0\frac{6}{8}$  Inch.  
Do do trunk,.....  $3\frac{2}{8}$   
Do do tail,... ..  $4\frac{4}{8}$

Entire length...  $8\frac{4}{8}$  Inches.

*Sub-Gen. LYGOSOMA*, Gray, apud. Dum. and Bibr.

Nostrils pierced through the nasal shield; no supranasals; palate toothless, with a small triangular incision, situated far back; scales smooth.

(2347) *LYGOSOMA CHALCIDES*, (Linne).

*Scincus pedibus brevissimis*, Gronov, P. II. N. 43.

*Lacerta chalcides*, Linne,

*Angvis quadrupes*, Linne, apud Hermann.

*Le Chalcide*, Daubenton.

*Der Vierfuss*, Muller.

*Lezard vert a ecailles lisses*, Vosmaer.

*Lacerta serpens*, Bloch, { Hermann.  
apud { Gmelin.  
Leske.  
Dound.  
Shaw.

*Angvis quadrupede*, Lacepede.

*Chalcida serpens*, Mayer.

*Lacerta serpens*, Dound, apud Shaw.

*Scincus brachypus*, Schneid. apud Merrem.

*Chalcides serpens*, Latreille.

*Seps pentadactylus*, Daudin.

*Seps* (*Angvis quadrupes*, Lin.) Cuv., apud Griffith, A. K.

*Mabouya serpens*, Fitzinger?

*Lygosoma serpens* } Wagler.

Gray, apud. } Griffith A. K.

*Lygosoma aurata*, Gray, apud Griffith, A. K.

*Tiliqua de Vosmaer*, Cocteau.

*Lygosoma brachypoda*, Dumeril and Bibron.

*Podophis chalcides*, Gray: Catal.

Blindworm-like; limbs excessively small: tail strong, conical, about two-fifth of the entire length. A single large lozenge-shaped fronto-parietal shield. Ear minute, circular. Lower eyelid scaly, with a few larger scales. Pre-anal scales larger than the rest.

Ground colour; iridescent lighter or darker copper, or bronze, in some with indistinct dark brown zigzag lines, produced by the scales being laterally edged or dotted with that colour. Beneath pale or whitish yellow. The tail in some minutely dotted with brown. Iris black with a minute golden ring. The supraorbital scales

## REPTILES OF THE

being somewhat transparent, the black colour of the eye gives them a blackish appearance.

*Habit*.—*Pinang*. Singapore, Java.

But two individuals were observed in the Great Hill of *Pinang*, one by Sir W. Norris, the other by myself. The latter made its appearance through a hole in the soft, moist mould beneath a group of *Polycopodium horsfieldii*. Above ground its movements were very quick, serpent-like, apparently little assisted by the tiny limbs. The head of the larger measured  $\frac{2}{3}$  inch, the trunk  $2\frac{7}{8}$  inches in length. One had but 4 toes on the anterior feet. In both the tail was reproduced, which is also the case in a third, from Singapore, preserved in the Museum of the Asiatic Society.

### OPHIDIA.

#### INOCUOUS SERPENTS.

#### FAM. TYPHLOPIDÆ, GRAY.

#### BURROWING.

*Gen.* PILIDION, Dumeril and Bibron.

Head covered with shields, cylindrical, very short, as if truncated, convex above, declivous in front; muzzle rounded; rostral shield like a large rounded cap covering the head and muzzle; an anterior frontal, a frontal, a pair of supra-orbital, ocular, nasal, and fronto-nasal shields; neither parietals, inter-parietals, nor præ-orbitals; nostrils hemispherical, under the muzzle, between the nasal and fronto-nasal shields; eyes excessively small, hidden by the ocular shields.

(2348) PILIDION LINEATUM, (Boie.)

*Aconitas lineatus*, Reinwardt, M.S.

*Typholope lineatus*, H. Boie.

*Typhlina*, Wagler.

*Typhlops lineatus*, Gray in Griffith, A. K.

*Typhlops lineatus*, Schlegel.

*Pilidion lineatum*, Dumeril and Bibron.

*Typhlops lineatum*, Gray: Catal.

Ground-colour pale gamboge or orange, uniform on the head, the apical third of the tail, and the abdomen; interrupted on the back and sides by 12 longitudinal, serrated brown lines, produced by a minute triangular spot on each side of the scales.

*Habit*.—*Pinang Hills*. Java, Sumatra, Singapore.

A single individual, captured by Sir William Norris, differs from the description given by M. M. Dumeril and Bibron in the comparatively greater dimensions of the tail. It is strongly arched; its length equals twice the breadth of the head; it is covered with 16 transversal series of scales, and it is considerably thicker than the rest of the uniformly cylindrical body. The anterior frontal shield is very broad, larger than

the frontal. It was of the following dimensions:—

	Ft.	Inch.
Length of the head,.....	0	$0\frac{2}{3}$
Do. do. trunk,.....	1	$0\frac{7}{8}$
Do. do. tail,.....	0	$0\frac{2}{3}$

1 ft.  $1\frac{5}{8}$  inch.

Circumference of the trunk  $\frac{5}{8}$  inch, of the tail  $\frac{9}{8}$  inch.

*Gen.* TYPHLOPS, Schneider.

Head covered with shields, depressed; muzzle rounded, covered above and beneath by the rostral shield; an anterior frontal, a frontal, a pair of supra-orbitals, one or two pairs of parietals and inter-parietals; a pair of nasals, fronto-nasals, præ-orbitals and oculars; nostrils lateral, hemispherical, opening in the suture between the nasal and fronto-nasal; eyes lateral, more or less distinct; pupil round.

(2349) TYPHLOPS NIGRO-ALBUS, Dumeril and Bibron.

*SYN.*—*Argyrophis bicolor*, Gray: Catal.

Shining black above; on the head some transversal and radiating whitish yellow lines; scales of the back edged with white; beneath whitish yellow.

*Habit*.—*Pinang Hills*, Singapore. Sumatra.

This species is closely allied to *T. diardi*. Schlegel, [*SYN.*—*T. diardi*, apud Dum. and Bibr.—*Argyrophis horsfieldii*, Gray: Catal.] an inhabitant of Assam and the Khassia Hills. Of two individuals observed, the larger was of the following dimensions:

	Ft.	Inch.
Length of the head,.....	0	$0\frac{4}{5}$
Do. do. trunk,.....	1	0
Do. do. tail,.....	0	$0\frac{8}{8}$

1 ft.  $0\frac{7}{8}$  inch.

Circumference of the trunk  $\frac{7}{8}$  inch, of the tail  $1\frac{1}{8}$  inch.

(2350) TYPHLOPS BRAMINUS, (Daudin.)

*L'Orvet lombric*, Lacepede.

*Angvis*. Rondoo Talooloo Pam. Russell, l. Pl. 43.

*Punctulated Slow-Worm*; Shaw.

*Eryx braminus*, Daudin.

*Typhlops rondoo talooloo*, Cuvier.

*Tortrix russellii*, Merrem.

*Typhlops braminus*, apud { Cuvier.  
Fitzinger.  
Gray in Griffith  
A. K.

*Typhlops russellii*, Schlegel.

*Typhlops braminus*, Cuvier, apud Dumeril and Bibron.

*Argyrophis braminus*, Gray: Catal.

Shining copper-coloured, or brown of various shades above, paler beneath. Some individuals of a uniformly bluish white. All the scales with a dark brown spot at the anterior part. The shields of the head have a whitish line close to



their margins. In the young the latter is cre-nulated, and the sides of the head, lips, throat, the anal region, and the point of the tail are yellowish or whitish, and the body is semi-transparent.

*Habit* — *Pinang, Singapore, Malayan Peninsula.* Canton-Province, Philippines, Guam (Marian Isles), Java, Tenasserim, Bengal, Assam, Coromandel, Ceylon, Malabar.

In the Malayan countries this species is numerous in hills and valleys. The eyes are black, the pupil round, which is also the case in *T. nigro-albus*. The largest of a great number examined was of the following dimensions:—

	Inch.
Length of the head,.....	$0\frac{3}{8}$
Do do. trunk,.....	$7\frac{2}{8}$
Do. do. tail,.....	$0\frac{1}{8}$
	—
	$7\frac{6}{8}$ inch.

Circumference of the neck  $\frac{4}{8}$  inch; of the tail  $\frac{5}{8}$  inch.

The preceding species of this family are all of similar habits. They mostly live under ground, but appear occasionally in shady places, particularly after showers of rain, in Bengal, in the rainy season. They are very agile, and appear to make use of the horny point of the tail as a propeller. When taken, they frequently press it against the hand in their attempts to escape. Reposing on the ground *Typhlops braminus* may easily be mistaken for an earthworm, until its serpentine movements, the darting of the white furcated tongue, while the head and neck are raised, make it known. In confinement they refuse food and water. In all dissected, the stomach contained some earth; in a few, remains of insects, (myriapoda, ants.) A young female had a string of six cylindrical soft eggs, of a yellowish white colour, each about  $\frac{2}{8}$  of an inch in length,  $\frac{1}{16}$  in diameter.

FAM. BOIDÆ, BONAPARTE.

BURROWING.

*Gen.* CYLINDROPHIS, Wagler.

Scales smooth, imbricate hexagonal; those of the abdomen broader than the rest; nostrils sub-vertical, opening in the lower part of the anterior frontal shield; neither nasals, frenals nor præ-orbitals; a single post-orbital; frontals large, reaching the minute eye, and the large 2nd and 3rd labials; supra-orbitals, occipitals and vertical distinct; tail very short.

(2351) CYLINDROPHIS RUFUS, (Laurenti.)

*Anguis rufa*, Laurenti, apud { Gmelin.  
Schneider.  
Shaw.

*Anguis striatus*, Gmelin.

*Anguis scytale*, Linne, apud Russell, II. Pl. 27.

*Shilay Pamboo*, Russell, II. Pl. 22 (young.)

*Anguis corallina*, Shaw.

*Eryx rufa*, Daudin.

*Tortrix rufa*, Merrem, apud { Gray.  
Schinz.  
Schlegel.  
Filippi.

*Scytale scheuchzeri*, Merrem.

*Ilysia rufa* Lichtenstein, apud Fitzinger.

*Cylindrophis resplendens*, Wagler.

*Cylindrophis rufa*, Gray, apud Dumeril and Bibron.

Iridescent blackish brown above, beneath with alternate black and yellowish white transversal bands or interrupted bars. Iris black, pupil vertically contracted by the light, tongue whitish. Central series of abdominal scales 206; sub-caudal 6.

*Habit.*—*Singapore.* Java, Tranquebar, Bengal. (?)

A single individual, turned up with the earth, in a garden at Singapore belonging to Dr. Montgomerie, differs from the description given by M. M. Dumeril and Bibron in the following particulars. The head is uniformly black, without the two scarlet frontal spots; the apex of the tail whitish; the posterior part of the body is more robust than the anterior; the length of the head forms more than  $\frac{1}{8}$  of the entire length of the animal; there are six pairs of labial shields on each jaw, and the scales of the trunk are disposed in 20 longitudinal series. It unites characters assigned by M. M. Dumeril and Bibron as distinguishing *Cylindrophis rufus* from *C. melanotus*, Wagler, and it would therefore appear that Dr. Schlegel is justified in considering the latter from Celebes (*Tortrix melanota*, Boie, M.S.) as a variety of *rufa*. In the present individual there is no external appearance of the very rudimentary anal hooks. It was slow in its movements, attempted to escape, but not to bite.

	Ft.	Inch.
Length of the head,....	0	$0\frac{3}{8}$
Do. do. trunk,..	1	$6\frac{2}{8}$
Do. do. tail,....	0	$0\frac{3}{8}$

1 ft.  $7\frac{1}{8}$  inch.

*Gen.* XENOPELTIS, Reinwardt.

Head rather narrower than the trunk, depressed, obsoletely angular; eyes small, round; nostrils large, apical; frenal shield very large; præ-orbital none; [Note. The single præ-orbital is very large, the frenal small, sub-rectangular; the nostrils open between the latter and the nasal shield], post-orbitals three; [Note. Three individuals examined, presented two post-orbital] interparietal very large, equalling the vertical; trunk thick, short with imbricate smooth hexagonal scales, disposed in longitudinal series, increasing in size towards the narrow abdominal scuta; tail thick, short, awl-shaped, beneath with scutella.

# REPTILES OF THE

(2352) *XENOPELTIS UNICOLOR*, Reinwardt.

*Xenopeltis unicolor*, Reinwardt (young.)

Guerin: Iconog. Pl. 21, Fig. 3.

*Tortrix xenopeltis*, Schlegel.

*Adult*.—Blackish or reddish brown above with strong metallic blue, purple, and green lustre; lips and throat buff; the lowest lateral series of scales, scuta and scutella pale reddish brown with broad whitish margins. Iris black; pupil lanceolate with the apex downwards, vertically contracted by the light: tongue buff.

*Young*.—Head yellowish white with a brown spot on the crown and labial shields; the scales of the sides edged with white, producing longitudinal zigzag lines; the two lowest series of scales and scuta yellowish white; scutella of the same colour with a brown transversal line.

Scuta 175 to 179; Scutella 26 to 27.

*Habit*.—*Penang, Singapore, Malayan Peninsula, Celebes, Java Sumatra.*

Of three young individuals, one was found by Sir William Norris on the Great Hill at Penang, a second by Dr. Montgomerie at Singapore, and a third was obtained in Province Wellesley, where also a single adult male was killed. As this serpent in general appearance bears a strong resemblance to *Lycodon aulicus*, (Linne) [Syn. *L. hebe*, apud Schlegel], so it also does in its fierce habits, and mode of attack. The scales are smooth, rhombic-hexagonal, disposed in 15 longitudinal series. Labial shields  $\frac{8}{8}$   $\frac{8}{8}$ . The stomach of a young individual examined, contained the remains of a rat. The adult attains to a much larger size than supposed: a male was of the following dimensions.—

	Feet.	Inch.
Length of the head, . . . . .	0	$1\frac{4}{8}$
Do. do. trunk, . . . . .	3	$2\frac{3}{8}$
Do. do. tail, . . . . .	0	4

3 ft.  $7\frac{7}{8}$  in.

Circumference of the neck  $2\frac{6}{8}$ , of the trunk  $4\frac{2}{8}$ , of the root of the tail 2 inch.

## TERRESTRIAL.

*Gen. PYTHON*, Daudin.

Entire shields under the abdomen and tail, the latter cylindrical, sometimes with scutella; anus with scales and a hook on each side.

(2353) *PYTHON RETICULATUS*, (Schneider)

Seba I, Tab. 62, Fig. 2; II. Tab. 79, Fig.

I. and Tab. 80 Fig. I.—

*Ular sawa*, Wurm.

*La jaune et bleue* Lacepede.

*L'oularsawa*, Bonnaterre.

*Boa reticulata*, Schneider, apud Daudin.

*Boa rhombeata*, Schneider. (?)

*Boa amethystina*, Schneider.

*Boa constrictor*, Var e, Latreille.

*Boa phrygia*; Shaw.

*Coluber javanicus*, Shaw.

*Boa constrictor*, Var 5, Daudin.

*Python amethystinus*, Daudin.

*Python des isles de la Sonde.*

*Python schneiderii*, { F. Boie.  
Guerin. .

Merrem, apud { Schlegel

*Coluber javanicus*, Fleming.

*Python javanicus*, { Fitzinger.

\* Kuhl, apud { Gray in Griffith A. K.

Eichwald.

*Constrictor* (*P. schneideri*, Kuhl) Wagler.

*Python reticulatus*, Gray, apud Dumeril and Bibron.

"*Ular sawa*" of the Malays.

[\* Note. *Python javanicus*, figured and described in Abel's Narrative, &c., is *Python molurus*, (Linne.)]

Ground-colour above light yellowish-brown, chestnut or olive-green, assuming a greyish hue on the sides, all the colours strongly iridescent, particularly reflecting metallic blue, or green. The head is divided from the muzzle to the nape of the neck by a black line, continued along the back to the point of the tail and describing a series of large lozenges, sometimes linked to each other by a small blacking, sometimes broken up into large irregular patches. A black oblique line proceeds from behind the eye towards the angle of the mouth, continuing on the sides as a series of more or less regular lozenges, which are joined to the lateral angles of those of the back by a large black triangular spot with a white arched mark in the centre. The scales nearest the black margins of the lozenges are of a lighter colour than the rest, sometimes whitish. Between and within the lateral lozenges appear numerous black spots, or interrupted lines. The lips (the lower in some present a black line), and abdominal scuta are gamboge, or pale yellow, as well as the lowest two or three series of scales, but the latter with irregular black spots. The caudal scutella, and scuta, when present, are yellow, marbled with black. The iris is silvery flesh-coloured or yellowish-brown, sometimes with a black bar; the pupil vertically contracted by the light. The tongue is black above, bluish white beneath. In the young the colours are brighter than in the adult.

Scuta 297 to 330. Scutella 82 to 102.

*Habit*.—*Malayan Penang and Islands. Chusan? Amboina, Java, Banka, Sumatra, Bengal?*

[Note. Skins are of frequent occurrence at Chusan, and the natives assert that the serpent is found there and on the neighbouring continent. Serpents from 14 to 16 feet in length, "Rock-snakes," were observed by several officers during our occupation of the island.

M.M. Dumeril and Bibron state that this species has been sent from Bengal by M. A. Duvaucel. The natives are not acquainted with it and the specimens in the Museum of the Asiatic Society are from Penang. The living animal is occasionally brought from the Straits of Malacca to Calcutta, and such is probably the



# MALAYAN PENINSULA AND ISLANDS.

history of the specimen sent from Bengal by M. Duvaucel. *Python molurus*, (Linne,) [Pedda Poda and Bora of Russell,] is very numerous in Bengal.

The two fossets of the rostral shield are pyriform with the apex diverging, and those of the nearest 3 or 4 upper labials are of similar shape. The inferior fossets are square, occupying the lower margin of the shield, varying from 7 to 9 on each side. The foremost of these is situated on the shield corresponding to that of the upper jaw, which borders the orbit.

This species is very numerous in the Malayan hills, and valleys, feeding upon quadrupeds and birds. It often takes up its abode in out-houses, preying at night, and is thus useful in destroying vermin, although plunder is occasionally committed in poultry yards. Dr. Montgomerie has seen in George Town, Penang, a young one which the inhabitants suffered to retain unmolested possession of the rice stores in order to secure them against the ravages of rats. Individuals of 16 ft. in length are of no rare occurrence. In 1844 one was killed at the foot of Penang, which a gentleman informed me measured more than 30 ft. During the expedition to China in 1840 one was shot from the poop of one of H. M. Transports, then riding in Singapore roads, between 3 and 4 miles from the shore. It was about 9 ft. long, and had the upper part of the head infested with *Ixodes ophiophilus*, Muller. The Chinese attribute great medicinal qualities to the heart and the gall bladder, and use the skin to cover the bodies of some of their musical instruments. *Python molurus*, (Linne,) Pedda Poda, Russell, I. Pl. 22, 23, 24, and Bora, Pl. 39, is said to occur, but rarely, in the Malayan Peninsula, but I never had an opportunity of seeing it.

## AQUATIC.

*Gen.. ACROCHORDUS*, apud Schlegel.

(*Acrochordus*, Hornstedt, 1787.—*Chersydrus*, Cuvier, 1817.)

*Acrochordus*, Hornstedt. Nostrils vertical, eyes encircled by a ring of minute scales; trunk compressed, attenuated towards both extremities; tail tapering, compressed; all the scales small, trifid, strongly keeled.

(2354) *ACROCHORDUS JAVANICUS*, Hornstedt.

*Acrochordus javanicus*, apud Shaw.

*Acrochordus javensis*, Lacep. apud Cuvier.

*Acrochordus javanicus*, apud Schlegel.

"Ular karong, or sapi, or lembu" of the Malays.

[Note. Ular signifies a serpent, karong a sac; sapi and lembua cow or ox. These expressive vernacular names refer to the loose skin, and the bulk of the animal.]

*Young.* Above dull greyish-brown; sides and lower parts pale yellow, or dirty ochre;

back with 3 longitudinal, undulating, frequently interrupted black bands; sides and abdomen with rows of rounded spots, marbled and dotted with black.

*Adult.* Of similar, but less distinct colours. Iris brown, pupil elliptic, vertically contracted by the light; tongue whitish.

*Habit.*—*Pinang, Singapore.* Java.

A female captured on the Great Hill at Pinang, at a distance from water, was of the following dimensions:

	Ft.	inch.
Length of the head,.....	0	1 $\frac{1}{8}$
Do. do. trunk,.....	1	7
Do. do. tail,....	0	9
		5 ft. 5 $\frac{1}{8}$ inch.

Greatest circumference one foot.

Notwithstanding the sharply compressed abdomen, the serpent moved without difficulty, but sluggishly on the ground, and preferred quiet. When touched she attempted to bite, but the pupil being contracted by the glare, she missed her aim. Shortly after being brought, while the rest of the body remained motionless, the posterior ribs were observed moving, and the serpent successively, in the course of about 25 minutes, brought forth twenty-seven young ones. Each birth was followed by some sanguinolent serum. With two exceptions the foetus appeared with the head foremost. They were very active, bit fiercely, and their teeth were fully developed. Shortly after birth the integuments came off in large pieces, which is also the case with the foetus of several species of *Homalopsis*. The present ones were placed in water, which however appeared to distress them, as they all attempted to escape on dry ground. Nearly all were of the following dimensions:—

	Ft.	Inch.
Length of the head,.....	0	0 $\frac{5}{8}$
Do. do. trunk,.....	1	1 $\frac{3}{8}$
Do. do. tail,.....	0	3
		1 ft. 5 inch.

The Malays of Pinang assert that this species is of very rare occurrence. During a residence of 20 years at Singapore, Dr. Montgomerie observed it but in a solitary instance. The physiognomy of this species bears a striking resemblance to that of a thorough-bred Bull dog, which in a somewhat less degree also may be said of the following.

*Sub-Gen. Chersydrus.* [This Sub-Gen. was founded upon the erroneous supposition that *Acrochordus fasciatus*, Shaw, possessed venomous organs.] Cuvier. Head and body uniformly covered small scales.

(2355) *ACROCHORDUS GRANULATUS*, (Schneider.

*Hydrus granulatus*, Schneider.

*Anguis granulatus*, Schneider.

# REPTILES OF THE

*Acrochordus fasciatus*, Shaw.  
*Acrochordus dubius*, Shaw.  
*Pelamis granulatus*, Daudin.  
*Chersydrus* (*A. fasciatus*, Shaw), Cuvier.  
*Acrochordus fasciatus*, apud Raffles.  
*Chersydrus granulatus*, Merrem, apud Wagler.  
*Acrochordus fasciatus*, apud Schlegel.  
 "Ular limpa," or "Ular laut" of the Malays.

Limpa, i. e. liver, liver-coloured.

**Young.** Blackish-brown or liver-coloured; the head with a few scattered yellowish white spots, the rest of the body with numerous rings of the latter colour, some interrupted on the back, others on the abdomen.

**Adult.** The dark colours fade to a dull greyish black, uniform on the back, and the sides and abdomen present alternate dark and whitish vertical bands. Iris black, pupil vertically contracted; tongue whitish.

**Habit.**—*Rivers and sea-coast of the Malayan Peninsula and Islands.* Bay of Manila, New-Guinea, Timor, Java, Sumatra, Coromandel.

This species appears not to exceed about 3 ft. in length. The body is less bulky and the skin less loose than in *A. javanicus*. But the form is more compressed, particularly the sword, or oar-like tail, and like that of the pelagic venomous serpents, appear exclusively calculated to aquatic habits. The scales also resemble those of the latter, and are generally smaller than in *A. javanicus*. Those of the back, the largest, are rounded rhombic, each with a minute tubercle in the centre. The skin in the interstices is finely wrinkled. On the abdomen the scales are mucronate, with a sharp, reclining central point. In both species the medial line is raised by 2 or 3 quincunx rows of scales with their points overlapping each other. The orbit is surrounded by a ring of scales a little larger than the rest. The nostrils, pierced high up on the muzzle, are almost vertical, slightly more so than they are in *A. javanicus*. In both they are tubular, larger in the present species, sinuous, and provided with a deeply seated membranous fold, which can hermetically close the passage. The mouth is secured in a similar manner by a central arched notch and two lateral protuberances, which correspond to a protuberance and two lateral cavities in the lower jaw. This contrivance also occurs in *Hydrus*, and to a certain extent in *Homalopsis*. With the exception of the dentition and the absence of venomous organs, in anatomical details both species of *Acrochordus* closely resemble *Hydrus*. As observed by M. Schlegel, the most striking feature is the great development of the lung, which occupies nearly three-fourths of the extent of the abdominal cavity. A somewhat similar arrangement also occurs in *Homalopsis*. All the maxillary teeth (inter-maxillary none) are strong, pointed, inwardly reclining and disposed in double or

treble rows. The 3 anterior teeth are the shortest: the upper jaw has on each side upwards of 20 teeth, the lower 3 or 4 less. The palatal teeth number 12 on each side, the pterygoid 9, and are shorter than the rest. *Acrochordus granulatus* is of no rare occurrence in the sea of the Malayan coasts although, according to Raffles, it is rarely seen on the coasts of Sumatra. At Pinang they are found among the fishes, taken in the stakes some 3 or 4 miles distant from the coast. M. Schlegel is mistaken in stating that this species never inhabits the sea, [Note. Essai, &c. p. 492.] and in censuring M. Eschscholtz, for his stating that the fishermen often take it in the Bay of Manila. A female of the following dimensions had six eggs:—

	Feet.	Inch.
Length of the head,.....	0	0 $\frac{5}{8}$
Do. do. trunk,.....	2	7 $\frac{3}{8}$
Do. do. tail,.....	0	3 $\frac{5}{8}$

2 ft. 11 $\frac{1}{8}$  inch.

Greatest circumference, 4 inches.

The egg is cylindrical, soft, coriaceous, whitish, about 1 $\frac{1}{2}$  inch in length. In each egg was coiled up a living young one of the following dimensions:

	Inch.
Length of the head,.....	0 $\frac{3}{8}$
Do. do. trunk,.....	9
Do. do. tail,.....	1 $\frac{4}{8}$
	10 $\frac{7}{8}$ Inch.

Greatest circumference, 1 inch.

In food and general habits, this species resembles the pelagic, venomous, serpents; in its element, it is active, but on dry land, blinded by the daylight, it is sluggish and of uncertain movements.

## FAM. COLUBRIDÆ, BONAPARTE. TERRESTRIAL.

*Gen. CALAMARIA*, H. Boie.

Body diminutive, elongated, obtuse at both extremities, throughout of equal diameter, cylindrical; eyes very small with round pupil; frontals one pair, laterally extending to the labials; frenals none; nostrils lateral, opening in a small shield between the frontal, rostral and anterior labial; one præ-orbital, four mental shields; dorsal scales rhombic, polished, smooth; tail very short.

(2356) *CALAMARIA LUMBRICOIDEA*, Schlegel, Var.

*Calamaria lumbricoidea*, Boie, MS.

*Calamaria virgulata*, Boie MS. (Young.)

Strongly iridescent, brownish-black, lighter, on the head scales with whitish edges; cheeks, lips and throat citrine; the lowest row of scales and abdominal surface yellowish white; sub-caudal scutella faintly marked with brown; eyes and tongue black.



# MALAYAN PENINSULA AND ISLANDS.

Scuta 169; Scutella 26.

*Habit.*—*Pinang, Singapore. Celebes, Java.*

This variety differs in nothing but colours from the species described by M. Schlegel. Of three individuals observed, two were taken by Sir W. Norris and W. T. Lewis, Esq. in the hills of Pinang, the third by Dr. Montgomerie at Singapore. The largest was of the following dimensions:

	Inch.
Length of the head,.....	$3\frac{3}{8}$
Ditto. ditto. trunk,.....	$11\frac{6}{8}$
Ditto. ditto. tail,.....	$1\frac{3}{8}$
	1 ft. $1\frac{4}{8}$ inch.

Circumference  $\frac{9}{8}$  inch.

The livery bears a remarkable resemblance to that of *Calamaria alba* (Linne), (*C. brachyorrhos*, Schlegel,) from which it however differs in the absence of the anterior frontal shields, and in having 13 instead of 17 longitudinal series of scales.

(2357) *CALAMARIA LINNEI*, H. Boie, Var. Schlegel.

*Calamaria reticulata*, Boie. MS. ?

*Changulia albiventer*, Gray: Ill. Ind.

Zool. Pl.—Fig. 6.9.\*

*Calamaria linnei*, Var. Schlegel.

[\* Note. Referred by M. Schlegel to *C. lumbricoidea*, but the characteristic distribution of the colours is that of the present Var. The figure however is not good, and not coloured from life.]

*Adult.*—Head brown, minutely dotted with black, lips and cheeks pale gamboge; trunk reddish brown, on each side with two vermillion longitudinal bands with black serrated edges; beneath carmine, with a black serrated line on each side; subcaudal scutella with a central black, zig-zag line; all the colours strongly iridescent; eyes black, tongue vermillion.

*Young.*—Like the adult, but with a broad black nuchal band, edged with white, a vermillion band at the root of the tail, and in some a similar near the point.

Scuta 166; Scutella 17.

*Habit.*—*Penang, Java.*

The present variety corresponds in all particulars to the description of *C. linnei* by M. Schlegel, who however does not mention that the two or three anterior teeth on each side of the lower jaw are longer than the rest. Of six individuals from the hills of Penang the largest individual measured—

	Inch.
Length of the head,.....	$0\frac{2}{8}$
Do. do. trunk,.....	$10\frac{1}{8}$
Do. do. tail,.....	$0\frac{5}{8}$
	11 Inch.

Circumference of the neck  $\frac{3}{8}$ , of the trunk  $\frac{4}{8}$  inch.

(2358) *CALAMARIA LONGICEPS*. n. s.

Strongly iridescent soot-coloured, a shade, lighter beneath; the scuta and scutella edged with whitish. Eyes and tongue black.

Scuta 131; Scutella 26.

*Habit.*—*Pinang.*

The head is elongated, narrow, conical; the muzzle rounded, projecting over the lower jaw. The anterior frontals are much smaller than the frontals, which on the sides occupy the place of the absent frenal shield, and thus reach the second upper labial; the nasal is very small, rectangular, perforated by the rather large nostril near the lower anterior angle. The eye is comparatively large, between an obliquely placed rectangular præ-orbital, and a similar post-orbital shield; the supra-orbitals are narrow, rectangular; the vertical moderate, pentagonal, arched and somewhat narrowed at the anterior margin. The occipitals, the largest, are elongated, bordered below by the large fifth upper labial, and behind by a single pair of post-occipitals. Each jaw has 5 pairs of labials. Of the 2 pairs of mentals, the anterior is the longer, and is enclosed by the rostral and 3 anterior labials, the posterior pair, by the fourth labial. The teeth are minute, sharp, reclining, all of equal size. The trunk is cylindrical, narrowed towards both extremities, covered with 15 longitudinal series of smooth, rhombic, imbricate scales. The abdomen is arched, the short tail tapering to a blunt point. This species approaches to *Calamaria alba* (Linne), (*C. brachyorrhos*, Schlegel,) but differs by its elongated shape of the shield of the head, and its larger eyes. A single individual, captured by W. T. Lewis, Esq., on the Great Hill of Pinang, was of the following dimensions:

	Inch.
Length of the head,.....	$0\frac{3}{8}$
Do. do. trunk, .....	5
Do. do. tail, .....	$0\frac{6}{8}$
	$6\frac{1}{8}$ inch.

Circumference of the trunk  $\frac{9}{8}$ , of the neck  $\frac{3}{8}$ , at the root of the tail  $\frac{3}{8}$  inch.

(2359) *CALAMARIA SAGITTARIA*.

*Calamaria sagittaria*, Cantor: Spicil.

Head yellow or white, marbled with black, forming a streak above the citrine lips; neck white with a black arrow-shaped mark; back partly ash, partly rust-coloured, with a medial series of distant minute black spots; sides bluish-black or grey, with a narrow black line above; beneath citrine, the throat marbled with black, and with a minute black spot near the lateral angle of each scutum. Iris golden; tongue carmine.

Scuta 216 to 227; Scutella 57 to 70.

*Habit.*—*Malayan Peninsula. Bengal, Assam.*

But for the diminutive size, and the reduced shields of the head and throat, this species

## REPTILES OF THE

might be taken for a *Coronella*. The head is but little distinct, depressed, ovate, covered by the normal number of shields. The anterior frontals are very small, pentagonal; the frenal short rectangular. The nostrils are rather large, piercing the middle of the nasal. The eyes are large, prominent with one præ-orbital, two post-orbitals; the upper jaw, but slightly longer than the lower, has on each side 6 labials, the lower 7, enclosing two pairs of small mentals. The temples are covered by three shields. The trunk, with 17 longitudinal series of smooth, rhomboidal imbricate scales, is slightly thicker towards the middle than at the extremities; the back throughout depressed, forming an angle with the sides, and the abdomen is flat, which makes a vertical section of the body square. The tail is very slender, tapering to a sharp point, and exceeds one-fifth of the entire length. The teeth are very minute, of equal size. A single specimen from the Malayan Peninsula was of the following dimensions:

	Inch.
Length of the head,.....	$0\frac{3}{8}$
Do do. trunk,.....	$9\frac{5}{8}$
Do. do. tail,.....	$2\frac{2}{8}$
	<hr/>
	$11\frac{7}{8}$ Inch.

Circumference of the trunk  $\frac{4}{8}$ : of the neck and root of the tail  $\frac{3}{8}$  inch.

In Bengal this species is of no uncommon occurrence particularly during the rainy season, when the water compels the serpents to leave the shady recesses which most of them occupy to avoid the heat of the day. The present species appears to be closely allied to the African *C. arctiventris*, Schlegel.

Of the preceding four species, the three first appear at Penang exclusively to inhabit the hills, but the variety of *C. lumbricoidea* occurs at Singapore in valleys. They are nowhere to be met in numbers. They are of gentle peaceable habits, never attempting to bite, and scarcely to escape. They are sluggish, move but slowly, and to a short distance, even when compelled by danger, and soon resume the motionless position which they appear to affect. The remarkable abstinence of most of their congeners, they possess but in a very limited degree. In captivity they refuse food, and soon expire; besides, they are so delicate, that slight pressure in examining them, is sufficient to kill them. Their bodies are very smooth, and brilliantly reflect rainbow-colours, which continue in preserved specimens, long after the gay livery has faded. They feed upon slugs, earth-worms, and insects.

The stomach of a *C. sagittaria* contained remains of an *Iulus* and some sand. In general appearance and habits these species of *Calamaria*

*Gen. CORONELLA*, Laurenti.

Head above covered with large plates, of which one between the eyes; sides of the head and occiput with imbricate scales; trunk narrowed near the head, thicker towards the middle; tail conical, elongated, tapering to a sharp point.

(2360) *CORONELLA BALIODEIRA*, Schlegel.

Patza Tutta, Russell I. Pl. 29?

*Coluber pictus*, Daudin?

*Coluber plinii* Merrem?

*Coronella baliodeira*, Boie. M.S.

Above slighter or darker olive brown, yellowish on the head, the scales minutely dotted with dark brown; the anterior part of the trunk with a number of distant transversal ocellated lines, composed of single transversal series of white scales, edged with black, labial shields yellow edged with black; beneath pearl coloured or yellowish white; iris golden, lower half blackish; tongue black.

Scuta 122 to 132; Scutella 65 to 72.

*Habit.*—Pinang. Java.

Of two individuals from the hills of Pinang, the larger was of the following dimensions:

	Ft.	Inch.
Length of the head,.....	0	$0\frac{5}{8}$
Do. do. trunk,.....	0	$8\frac{5}{8}$
Do. do. tail,.....	0	$3\frac{5}{8}$
	<hr/>	<hr/>
	1 ft.	1 inch.

Circumference of the neck  $\frac{4}{8}$ , of the trunk  $\frac{7}{8}$ , of the root of the tail  $\frac{3}{8}$  inch.

Both agree with the description of *M. Schlegel*, except in having two small præ-orbitals instead of one. Russell's No. 29, from Casemcottah, which according to *M. Schlegel* is *Coluber pictus*, Daudin, *C. plinii*, Merrem, is probably intended to represent the present species. It is of fierce habits.

*Gen. XENODON*, H. Boie.

Head scarcely distinct, muzzle obtuse, nostrils rounded, between 3 shields; eyes encircled behind only by 3 shields; trunk short robust; tail rather short, slowly tapering; 4 very large mentals, the last upper maxillary tooth the longest.

(2361) *XENODON PURPURASCENS*, Schlegel.

*Coronella albocincta*, Cantor. (Var.)

Above olive brown with black spots, and numerous pale red transversal zig-zag bands, each with a submarginal black line. The first occupies the space between the eyes, continuing obliquely backward over the cheeks and lips; the second, arrow-shaped, diverging over the neck; labial shields yellow with brown margins. Beneath strongly iridescent pale carmine; every other scutum entirely or partially black near the lateral angles. Iris circular, golden, lower half dotted with black; tongue black.

Scuta 179 to 183; Scutella 36 to 65.

*Habit.*—Penang. Java, Tenasserim, (Var.) Chirra-Punji, Assam, Darjeeling, Midnapore (Ben-



# MALAYAN PENINSULA AND ISLANDS.

A solitary individual observed on the summit of the Great Hill of Pinang, defended itself vigorously. The dimensions were :

	Ft.	Inch.
Length* of the head,.....	0	1
Do. do. trunk.....	1	8 $\frac{3}{8}$
Do. do. tail.....	0	3 $\frac{5}{8}$
	2 ft.	1 in.

Circumference of the neck,  $1\frac{1}{8}$  of the trunk 2, of the root of the tail  $1\frac{1}{8}$  inch. It differs from the description of M. Schlegel in having 21 longitudinal series of scales instead of 19, and on the right side 3 præ-orbitals. Labials on each side  $\frac{8}{10}$ . The variety described as *Coronella albocincta* inhabits Assam, Chirra Punji, Darjeling, Midnapore (Bengal.) It differs from those of the southern localities in having the head not distinct from the trunk, and its shields are shorter. The eyes are smaller, and, owing to the much swollen cheeks, appear sunk, which with the remarkably shelving profile, contribute to render the physiognomy singularly scowling. The largest specimen in the museum of the Asiatic Society measures in length 2 feet  $5\frac{3}{8}$  inch, of which the head  $\frac{6}{8}$ , the trunk 2 feet  $1\frac{5}{8}$ , and the tail 3 inch. In all, the livery is individually varying, but the arrow-shaped mark, double in some, appears to be constant. Labials on each side  $\frac{7}{9}$ .

Gen. LYCODON, H. Boie.

Head not very distinct, oblong, depressed ; supra-orbital shield triangular narrow in front ; præ-orbital one ; post-orbitals two ; frenal one ; eyes sunk, far removed from the muzzle ; pupil vertical ; trunk elongated, somewhat compressed with smooth, rhomboidal, imbricate scales ; tail short, tapering ; anterior maxillary teeth longer than the rest. \*

(2362) LYCODON AULICUS, (Linne)

*Coluber aulicus*, Linne (not apud Daudin.)

Russell \* I. Pl. 16, Gajoo Tutta.

*Coluber striatus*, Shaw.?

*Coluber malignus* Daudin.

*Lycodon hebe*, Boie, apud Wagler, Schlegel (excl. synonym. *Col. hebe*, Daud.)

[\* Note. Russell 1, Pl. Karetta upon which is founded *Coluber galathea*, Daudin, appears to represent the present species, or one of its varieties.

[Note by Mr. Elliot—There are numerous varieties of *Lycodon aulicus*, I have met with several more than are enumerated here.]

Lighter or darker chestnut with numerous white transversal bands, (in some spotted with black,) on the sides forming a forked network, composed of brown scales edged with white ; on each side of the hindhead a white triangular spot (confluent in some,) with brown spots, lips similarly coloured ; beneath pearl-coloured ; eyes black ; tongue whitish.

Habit.—*Pinaug*. Bengal, Coromandel.

Var. A.

*Lycodon hebe*, Var. Schlegel.

With a number of large square white spots, with black edges and central spots.

Habit—*Pinang*. Bengal.

Var. B.

Russell II, Pl. 37.

*Lycodon capucinus*, Boie.

*Lycodon hebe* Var. *javan*, Schlegel.

*Lycodon atropurpureus*, Cantor.

Chestnut or deep purple marbled with white veins, edged with black, with or without a white collar.

Habit.—*Pinang*, *Malayan Peninsula*. Tenasserim Provinces, Java.

Var. C.

*Lycodon hebe*, Var. *timorensis*, Schlegel.

Chestnut, with a white collar, and indistinct traces of white network.

Habit.—*Pinang*, *Malayan Peninsula*, Pulo Samao, Timor.

Var. D.

Russell II, Pl. 39.

*Lydocon subfuscus*, Cantor.

Uniformly light brown above, the lips white, edged with brown.

Habit.—*Malayan Peninsula*. Bengal.

This species occurs in the Malayan countries, both in the hills and valleys, but it is apparently not so numerous as it is in Bengal. It is of fierce habits and defends itself vigorously. In one examined the stomach contained a young *Euprepis rufescens*, (Shaw).

The largest individual observed, Var. B., was of the following dimensions :—

	Feet.	Inch.
Length of the head,.....	0	0 $\frac{2}{8}$
Do. do. trunk,.....	1	8 $\frac{7}{8}$
Do. do. tail,.....	0	4 $\frac{1}{8}$
	2 ft.	1 $\frac{5}{8}$ in.

Circumference of the neck 1 inch, of the trunk  $1\frac{1}{8}$ , of the root of the tail  $\frac{7}{8}$  inch.

*Ophites*, Wagler, differing from *Lycodon*, in the absence of the præ-orbital shield ; frenal elongated ; eyes small, scales rhombic with truncated points ; some of the posterior dorsal scales keeled.

(2363) LYCODON PLATURINUS, (Shaw.)

Seba Thes I, 83, 3.

Russel, II, Pl. 41.

*Coluber platurinus*, Shaw.

*Coluber platyrhinus*, Merrem.

*Lycodon subcinctus*, H. Boie.

*Ophites*, Wagler.

*Lycodon subcinctus*, apud Schlegel.

Shining blackish brown with steel blue reflec-

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bands, the lips, throat and a collar all white, spotted with black; beneath pale blackish brown, the anterior part of the abdomen, the sharp lateral angle and the broad posterior margins of the scuta and scutella whitish. Eyes black; tongue flesh-coloured.

Scuta 221; Scutella 74.

*Habits.*—*Penang*. Java, Bengal.

[Note. According to M. Schlegel, who observes that a specimen has been forwarded from Bengal by M. Duvaucel. No specimen exists in the Museum of the Asiatic Society, nor are the natives acquainted with the species.]

On both sides of each jaw the anterior 4 or 5 teeth increase in size and are longer than the rest. The fifth upper maxillary tooth is removed from the preceding, which in addition to the general shape of the head and the lax integuments, imparts to this serpent a striking resemblance to the venomous genus *Bungarus*. In fierceness it resembles the preceding species. The only individual observed was captured near the summit of the Great Hill of Pinang, where it had seized a large *Euprepis rufescens*, (Shaw.) It was of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	1
Do. do. trunk,.....	2	$8\frac{4}{8}$
Do. do. tail,.....	0	$7\frac{4}{8}$
	3 ft.	5 in.

Circumference of the neck  $1\frac{5}{8}$ , of the trunk  $2\frac{4}{8}$  inch.

(2364) *LYCODON EFFRÆNIS*, n. s.

Shining bluish black above, with a few minute white spots, not affecting the ground colour; the throat, lips, and a band bordering the sides of the head from the muzzle to the hind head, buff coloured, finely marbled with black; beneath strongly iridescent, pale bluish black, the scuta with whitish edges; the body encircled by a number (11,) of broad distant buff rings, above with indentated margins. Eyes black, pupil elliptical; tongue whitish.

Scuta 228; Scutella 72.

*Habit.*—*Pinang*.

The head is elongated, ovate depressed, broader than the neck, the muzzle rounded, slightly projecting; the anterior frontals are orbicular pentagonal, much smaller than the frontals which are bent over the sides, substituting the absent frenal, so as to meet the second upper labial; the nasal is small, rectangular, obliquely wedged in between the rostral, the two pairs of frontals, and the anterior upper labial; the nostril large, piercing the middle of the shield; the vertical is elongated pentagonal, broader in front, so as to render the posterior part of the moderate supraorbitals broader than the anterior;

each side surrounded by 3 scales, somewhat longer than the rest covering the temples, and behind by two small post occipitals. The eyes are proportionally large and prominent, surrounded by one præ-orbital and two smaller post-orbitals, the lower of which touches the narrow projecting fifth upper labial, which with the fourth, borders the lower part of the orbit; the jaws are covered by 8 pairs of upper, 9 of lower labials. The gape is moderate; the particulars of the dentition noted in *L. platurinus*, exist in the present species. The two anterior of the three pairs of small elongated mental shields are bordered by the six anterior pairs of labials; behind by a number of small scales. The trunk is slender, decreasing towards both extremities, with 17 longitudinal series of smooth, rhomboidal, slightly imbricate scales. The back is depressed, forming an angle with the compressed, somewhat bulging sides. The latter are joined to the flat narrow abdomen under a right angle on the sides of the scuta, so that the vertical section of the body is quadrangular. A single individual found by Sir Wm. Norris on the Great Hill of Pinang, was of the following dimensions:

	Ft.	Inch.
Length of the head,.....	0	$0\frac{4}{8}$
Do: do. trunk,.....	0	$9\frac{4}{8}$
Do. do. tail,.....	0	$2\frac{2}{8}$
	1 ft.	$0\frac{4}{8}$ inch.

Circumference of the neck,  $\frac{4}{8}$ , of the trunk  $\frac{5}{8}$ , of the root of the tail  $\frac{2}{8}$  inch.

In fierceness the present species resembles its congeners, but unlike them, it raises vertically the anterior part of the body, and bites after a few oscillating movements from side to side. *Lycodon platurinus*, and *auicus*, like many other harmless, and some venomous serpents, the pupils of which are vertically closed by the light, prepare to attack horizontally coiled on the ground, with the head bent close to the body, and drawn as far backwards as possible, when, suddenly uncoiling the anterior part of the body, they dart obliquely upwards, but as they are blinded, not always in the direction apparently aimed at, and they frequently miss the aim.

*Gen.* COLUBER, Linne.

Abdomen with scuta; scutella under the tail.

(2365) *COLUBER FASCIOLATUS*, Shaw.

Russell, I. Pl. 21 Nooni Paragoodoo.

*Coluber hebe*, Daudin (Synon, apud Boie, Wagler, Schlegel).

“Cinereous grey with an obscure cast of reddish brown, particularly about the head and neck. The back variegated by black and white, or black and yellowish, narrow bands; and on the sides are two or three rows of short, separate



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of the lateral scales; but in general these bands are not visible on the tail. The scuta (192) and scutella (62) are of a dusky pearl-colour." (Russell I. pg. 26.)

*Habit.*—*Malayan Peninsula.* Coromandel Coast.

A young individual, killed in Province Wellesley corresponds to the description of Russell, copied by Shaw and Daudin. It has too small post-orbitals, one elongated pre-orbital, one minute irregularly hexagonal frenal, and on each side 8 upper, 9 lower labial shields. The trunk is covered by 21 longitudinal series of smooth imbricate scales, which are rhombic on the sides, rhomboidal above, all with rounded points. The teeth are of uniform size, and as Russell correctly describes them, very small, reflex, sharp, numerous. The dentition, therefore, sufficiently indicates that the species cannot be placed in the Gen. *Lycodon*, to which it has been referred by M.M. H. Boie, Wagler and Schlegel. The young one is of the following dimensions:—

	Inch.
Length of the head,.....	$0\frac{4}{8}$
Do. do. trunk,.....	$8\frac{1}{8}$
Do. do. tail,.....	$2\frac{1}{8}$
	<hr/>
	$10\frac{6}{8}$ inch.

Greatest circumference of the trunk  $\frac{5}{8}$  inch.  
Scuta 201; Scutella 73.

(2366) *COLUBER RADIATUS*, Schlegel.

Russell II. Pl. 42.

*Coluber quadrifasciatus*, Cantor, (Var.).

Head and back light yellowish bay, paler on the sides; the hind head with a transversal black line, branching off along the exterior margins of the occipitals; a black oblique streak behind the eyes, and another beneath them dividing both jaws. On each side of the back a broad longitudinal black band, relieved at intervals by a short network, produced by 3 or 4 scales of each series being edged with pale-brown, and the skin between them white. The bands in some commencing at a distance from the head, are continued or interrupted terminating on the posterior part of the back. Below them is on each side a parallel black line; lips, throat and lower surface yellow. Iris bright gamboge with a concentric black ring. Tongue bluish black.

*Young.*—Above of clearer colours; beneath pearl-coloured.

Scuta 222 to 248; Scutella 82 to 94.

*Habit.*—*Pinang, Singapore, Malayan Peninsula.* Java, Sumatra, Cochin-China, Tenasserim, Assam.

This species is numerous in marshes, and paddy-fields, and often becomes a tenant of out-houses, where during the day it remains concealed, till nightfall favours its pursuit after rats. It

is however equally diurnal, preying upon smaller birds, lizards and frogs. Assam produces a local variety distinguished by 18 instead of 17 longitudinal series of scales, of which the 3 upper ones are all lineated, whereas normally such is the case on those of the posterior part of the body. It makes a vigorous defence, and in darting at an enemy is capable of raising nearly the anterior two-thirds of the body from the ground. In a female were found 23 whitish, soft, cylindrical eggs, of which the largest measured  $1\frac{1}{8}$  inch in length. The largest individual observed was of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	$1\frac{4}{8}$
Do. do. trunk,.....	5	$3\frac{4}{8}$
Do. do. tail,.....	0	$10\frac{4}{8}$
	<hr/>	<hr/>
	5 ft.	$3\frac{4}{8}$ in.

Greatest circumference  $3\frac{5}{8}$  inch.

Habits and general appearance link the present species to *Col. dhumnades*, Cantor, Chusan,—which is covered by 14 to 16 longitudinal series of rhomboidal scales, of which those of the two-uppermost series commence at a short distance from the head, exhibiting the central raised line, and *Col. mucosus*, Linne (*Col. blumenbachii*, Merrem,) but the latter as well as its variety with uniformly smooth scales (*Col. dhumna*, Cantor: *Spicil.*) utter when irritated a peculiar diminuendo sound, not unlike that produced by a gently struck tuningfork.

(2367) *COLUBER KORROS*, Reinwardt.

*Coluber korros*, Reinwardt, apud Wagler, Schlegel.

Brownish green above, the scales of the posterior part of the trunk and of the tail with black points and edges, producing a regular network; beneath yellowish white or pearl-coloured; the latter part of the scuta light bluish-grey. Iris bright yellow with a bluish grey or blackish concentric ring, tongue black.

*Young.*—Above with some indistinct transversal bands, produced by two lateral white spots on some of the scales; the posterior part of the trunk with dark longitudinal lines.

Scuta 162 to 190; Scutella 79 to 136.

*Habit.*—*Pinang, Singapore, Malayan Peninsula.* Java, Sumatra, Arracan, Tenasserim.

It is numerous in the Malayan vallies. The largest individual measured:

	Feet.	Inch.
Length of the head,...	0	$1\frac{2}{8}$
Do. do. trunk...	2	$6\frac{2}{8}$
Do. do. tail,.....	1	$4\frac{2}{8}$
	<hr/>	<hr/>
	3 ft.	$11\frac{6}{8}$

Greatest circumference of the trunk 3 inches.

Its habits are similar to those of the last mentioned species, from which it is easily distinguish-

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ed by its 15 longitudinal series of smooth rhomboidal scales with rounded points.

## (2368) COLUBER HEXAHONOTUS, N.S.

Head and back dark brown, changing to pale brownish buff on the side; trunks with numerous, close, transversal black bands, each with a few white spots on the lower parts, becoming indistinct towards the posterior extremity of the trunk, from whence the colour is uniformly dark brown; labial shields yellow, edged with black; beneath yellowish white, scutella edged with brown. Iris gamboge with a black concentric ring; pupil round, tongue black; central series of dorsal scales hexagonal.

Scuta 191; Scutella 148.

*Habit.*—Pinang.

The head is distinct, elongated, with the muzzle broad, truncated, covered above with the normal number of shields, in form resembling those of Col. korros. The eyes are large, prominent, with two præ-orbitals, of which the superior is the larger, the inferior is wedged in between the 3rd, 4th and 5th upper labials. In addition to two post orbitals, there is an elongated crescent-shaped infra-orbital, resting on the 6th and 7th upper labials. The latter are 8 on each side, of which the 5th, broad hexagonal, borders the orbit; the following are elongated, gradually increasing in size. The lower labials, 9 on each side, lie on the chin in contact with two pairs of elongated shields. The nostrils are rather large, orbicular, opening near the margin of the anterior frontals. The frenal is small, obliquely situated between the surrounding shields. The temples are covered by two pairs of elongated shields. The gape is wide, the teeth minute, of equal length. The trunk is slender, much compressed with 17 longitudinal series of smooth, rhombic, sub-imbricate scales, of which the central series is hexagonal. The abdomen narrow, arched. The tail is very slender elongated, tapering to a sharp point.

A solitary individual, discovered by Sir William Norris on the Great Hill of Pinang, was of the following dimensions:—

	Ft.	Inch.
Length of the head,.....	0	0 $\frac{5}{8}$
Do. do. trunk,.....	1	0
Do. do. tail,.....	8	4 $\frac{5}{8}$
	1 ft. 3 $\frac{3}{4}$ inch.	

Circumference of the neck  $\frac{5}{8}$ , of the trunk 1 inch, of the root of the tail  $\frac{3}{8}$ . In fierceness it resembled the preceding species.

## ARBORIAL.

*Gen.* DIPSAS, Laurenti.

Head large, broad, depressed, cordate, covered with shields; neck narrow, trunk much narrower

than the head, compressed, very long, beneath covered with scuta, tail cylindrical, imbricate.

## (2369) DIPSAS DENDROPHILA, Reinwardt.

Scheuchzer, 662, Fig. II. (Col. variabilis, apud Merrem.)

Dipsas dendrophila, apud Wagler.

Dipsas dendrophila, Wagler, apud Horsfield: Life of Raffles.

Dipsas dendrophila, apud Schlegel.

Head, back and sides intense black with steel-blue, lilac, and green reflections; beneath pale black, iridescent; body and tail with numerous bright yellow transversal bands, widened below, sometimes joined on the back or abdomen, occasionally reduced to irregular spots; throat and lips bright yellow, labials with black edges. Pupil elliptical, vertical; iris and tongue black.

Scuta 218 to 225, Scutella 100 to 112.

*Habit.*—Pinang, Singapore, Malayan Peninsula. Java, Celebes.

It inhabits the Malayan hills and valleys, but apparently in no great numbers. The largest individual measured—

	Feet.	Inch.
Length of the head,.....	0	1 $\frac{4}{8}$
Do. do. trunk,.....	3	2 $\frac{7}{8}$
Do. do. tail,.....	1	0
	4 ft. 5 $\frac{3}{8}$ inch.	

Greatest circumference of the trunk, 4 inch.

## (2370) DIPSAS MULTIMACULATA, Schlegel.

Scheuchzer, 657, Fig. 2.

Russell, II. Pl. 23.

Dipsas multimaculata, Schlegel.

Ground-colour, above light greenish grey, minutely spotted and marbled with brown; on the head an angular, backwards diverging black mark with whitish edges; a black oblique line from behind the eyes to the hind head, where it joins a lozenge-shaped black spot with whitish edges; along the back and tail a series of large, irregularly oval, black spots with whitish edges, arranged in close quincunx series; the sides with numerous, similarly coloured, oblique or arched, often interrupted, bands; labials greenish white, black-edged; beneath greenish white tinged with rose-colour, minutely spotted with brown, and with a double or treble lateral series of irregular black spots. Iris pale greenish golden, minutely dotted with black; pupil elliptical, vertical; tongue whitish.

Scuta 202 to 235; Scutella 80 to 106.

*Habit.*—Pinang, Malayan Peninsula. Celebes, Java, Tenasserim, Bengal.

On the hills of Pinang this species appears to be more numerous than the former. The largest individual measured—



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	Feet.	Inch.
Length of the head,.....	0	$0\frac{5}{8}$
Do. do. trunk,.....	1	$10\frac{4}{8}$
Do. do. tail,....	0	$5\frac{5}{8}$
	2 ft.	$4\frac{7}{8}$ in.

Greatest circumference,  $1\frac{3}{8}$  inch.

The central hexagonal scales are elongated, narrow on the anterior part of the trunk, which is covered by 19 longitudinal series of smooth, lanceolate, imbricate scales; from thence commence 17 series of broader scales.

(2371) *DIPSAS CYNODON*, Cuvier.

*Dipsas cynodon*, apud Boie, Guerin, Schlegel.

*Young*.—Ground-colour yellowish brown, head with a dark black-edged arrow-shaped mark, and a black oblique streak from the eye to the nape of the neck; labials pearl-coloured, edged with black; back with numerous black transversal marks, shaped like two letters Y placed horizontally towards each other or in quincunx, becoming indistinct towards the tail. Beneath pearl-coloured with a black spot near the lateral part of the scuta; scutella edged and minutely dotted with brown.

Scuta 225; Scutella 92.

*Adult*.—Head and back uniformly greyish brown tinged with lilac, with a number of distant large, transversal, purple, bands (the scales edged with black), lozenge-shaped with triangular lateral appendages, becoming indistinct towards the tail, which is alternately brownish buff and purple with black-edged scales. Beneath pale yellow, scutella minutely dotted and edged with brown. Iris pale golden, minutely dotted with purple; pupil elliptical, vertical; tongue whitish.

Scuta 275, Scutella 153.

*Habit*.—*Pinang, Malayan Peninsula. Java, Tenasserim.*

A young one was captured on the Great Hill of Pinang by W. T. Lewis, Esq. An adult, killed in Province Wellesley, was of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	$1\frac{4}{8}$
Do. do. trunk,....	4	$0\frac{3}{8}$
Do. do. tail, ...	1	4
	5 ft.	$5\frac{7}{8}$ in.

Circumference of the neck  $1\frac{6}{8}$ , of the trunk  $2\frac{4}{8}$  inch.

The young had 21, the adult 23 longitudinal series of smooth, lanceolate, imbricate scales. The long maxillary and palatal teeth are proportionally less developed in the young than in the adult.

(2372) *DIPSAS BOA*, (H. Boie.) (See Plate, Fig. 3.)

*Amblycephalus boa*, H. Boie; Isis.  
*Dipsas boa*, apud Schlegel.

Ground colour above: rose coloured washed with brown, varying in intensity and shade from light bay to umber, prevailing so as to make the ground colour appear as minute spots, and with numerous irregular black spots, confluent on the head; cheeks and lips carnation, with a vertical black streak from the middle of the orbit. Beneath carnation, dotted with umber, sometimes assuming the shape of the large irregular spots. Iris: silvery rose-coloured, lower half dotted with black, pupil elliptical, vertically contracted by the light; tongue whitish.

Scuta abdominalia 164; Scuta subcaudalia 112; or 170 + 109.

*Habit*.—*Pinang, Java.*

The head is depressed, elongated, conical, with the muzzle truncated; the rostral shield is very large, vertically placed; the cheeks compressed, but the lips very tumid below the eyes. Of the nine crown shields the occipitals are distinguished by their reduced size, and frequent subdivision in 2 linear inter-occipitals, bordered by two large polygonal post-occipitals, enclosing a smaller third, linear. Behind the latter appears on each side a small hard tubercle, covered like the rest of the hind head with minute polygonal scales. Each temple is protected by 5 to 6 large shields and as many smaller resting upon the labials. The nasal is large, pyramidal with the rounded nostril in the centre, and the apex wedged in between the 3 frenals, placed obliquely or vertically one above the other. The eye is large, prominent, encircled by the supra-orbital and 7 smaller shields, so that none of the upper labials reach the orbit. The lips are arched, and outwardly appear to reach to the hind head, but the commissure, or the angle of the mouth is situated immediately below the eye, which greatly reduces the opening of the mouth. Of the 9 pairs of upper labials the anterior 6 are narrow, but very deep and bulging; the posterior 3 are broader, elongated; the inferior labials, 11 pairs, are as well as the rostral, greatly reduced by the 3 pairs of very large mentals. The front view of the head grotesquely resembles that of a mastiff. All the teeth are strong, but the front tooth on each side of the lower jaw is longer than the rest; the palatal rows are very close together, and converging. The trunk is much compressed, covered by 13 longitudinal series of scales, of which the dorsal row is composed of very large hexagonal ones, each with a strong keel; the rest are smooth, rhombic, imbricate. The abdomen is very narrow, and the sides of the scuta are bent upwards. The tail is elongated, slender, tapering, and much less compressed than the trunk. Of two individuals from the hills of Pinang, the

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larger, a male, was of the following dimensions :—

	Feet.	Inch.
Length of the head,.....	0	1
Do. do. trunk,.....	1	11
Do. do. tail,.....	0	11½
	2 ft.	11½ in.

Circumference of the neck 1 inch, of the trunk 1½, of the root of the tail ¾ inch. In a female were observed 4 cylindrical, whitish eggs, each ⅝ inch in length. The stomach contained a few remains of insects.

This species is closely allied to *Dipsas carinata*, Schlegel, (*Amblycephalus*, Kuhl; *Paras*, Wagler,) in which also the dorsal series of scales are keeled. M. Schlegel's short description and figure (Pl. XI, 29, 30) appear to have been taken from an immature specimen.

The preceding four species are very fierce, their mode of attack is that of *Lycodon anlicus*. Kuhl has observed vibrating movements in the tail of *Dipsas multimaculata*, which however are also exhibited by *Dipsas trigonata* (Schneider), (*Col. catenularies*, Daudin,)—*D. cynodon*, Cuvier, and among the venomous serpents, by *Vipera russelii*, (Shaw) and several Asiatic species of *Trigonocephalus*, when they are irritated and preparing to bite.

## Gen. HERPETODRYAS, H. Boie.

Head trigonal, very long depressed, smooth, rather sharp; trunk and tail very elongated; scales, particularly those of the tail, large; those of the back partially carinate; in other respects resembling *Coluber*.

(2373) *HERPETODRYAS OXYCEPHALUS*, (Reinwardt.)

*Coluber oxycephalus*, Reinwardt.  
*Gonyosoma viride*, Wagler.  
*Herpetodryas*, apud Schlegel.

Head above shining dark-green with a blackish straight line from the nostrils to the angle of the mouth: lips and throat pale yellowish green; on the lower part of the sides, all the scales with black edges; the anterior half of the tail, separated from the trunk by a transversal orange band, ochre, gradually changing to greyish brown on the posterior half, all the scales edged with black. Abdominal scuta light yellowish green with pale yellow edges; subcaudal scutella grey with black margins. Eyes moderate, little prominent; iris pale sea-green with a narrow pale yellow inner ring and a transversal black band; pupil circular, black. Tongue ultramarine, divided in the middle by a black longitudinal line. The exposed part of the larynx black.

Scuta 268; Scutella 149.

*Habit.*—Pinang, Java, Celebes.

The shields of the head are elongated, most so the linear frenal. The teeth are numerous; in each row the anterior six or eight are longer than the rest, which gradually decrease. The scales of the trunk, in 25 longitudinal series, are rhombic with rounded points, imbricate, and all smooth except those covering the spinous processes, which are faintly lineated.

Of two individuals from the hills of Pinang, the larger, taken by Sir William Norris, was of the following dimensions:

	Feet	Inch.
Length of the head,...	0	1½
Do. do. trunk,..	3	4
Do. do. tail,....	1	1
	4 ft.	6½ inch.

Circumference of the neck 2, of the trunk 3, of the root of the tail 1½ inch.

The ferocious habits of this serpent have been accurately described by M. Reinwardt. It has in a remarkable degree the power of laterally compressing the neck and the anterior part of the body, when the greyish blue skin becomes visible between the separated scales. In such state of excitement it raises nearly the anterior third vertically from the ground, continues fixed during several seconds with vibrating tongue, and bites. It then throws itself down, to rise to a renewed attack. A similar mode of attack characterises the following species, viz: *Dryinus nasutus*, (Lacepede,) (Russell, I. Pl. 12 and 13,)—*D. prasinus*, (Reinwardt.) (*Dryophis prasina* apud Schlegel,) *Leptophis pictus* (Gmelin), and *Leptophis caudalicatus*.

## Gen. DRYINUS, Merrem, 1820.

[Note. In H. Boie's Genera, published in Isis, 1827, *Dryophis*, (Dahlman,) is substituted for this genus. Wagler in 1830 separated some species and the denomination of *Tragops*, and M. Schlegel in his "Essay" has exclusively retained *Dryophis* although Prof. Thos. Bell already in 1825 had published his article on *Leptophina*, comprising *Dryinus*, Merrem, and *Leptophis*, Bell.]

Upper jaw much longer than the lower; middle attenuated more or less acute at the apex, which in some species is mucronate and moveable.

(2374) *DRYINUS PRASINUS*, (Reinwardt.)

Seba, II, Tab. LIII, Fig. 4,  
*Coluber nasutus*, Shaw, apud Russell,  
II. Pl. 24.

[This specific name was previously applied by Lacepede in 1790 to the other Asiatic species.]

*Dryinus nasutus*, Bell, (not Merrem, 1820.)

*Dryophis prasinus*, Reinwardt.

*Tragops*, Wagler.

*Dryinus nasutus*, Bell, apud Horsfield:  
Life of Raffles.

*Passerita*, Gray.

*Dryophis prasina*, apud Schlegel.

"Ular daun" of the Malays.



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Leek-green above, with some irregular white and black oblique lines, paler on the cheeks and upper lips; tail cinnamon; under lips and throat white, scuta and scutella light green or mother-of-pearl, on each side with a white or pale yellow longitudinal line, below which in some a second, green line. Pupil black, elongated-pyriform, with the apex turned forwards, horizontally contracted by the light. Iris pale burnished golden, bright on the pupillary margin, the upper half of which forms a little behind its middle a small pointed lobe. Tongue bluish white.

Scuta 186 to 223; Scutella 140 to 203

*Habit.*—*Malayan Peninsula and Islands.* Celebes, Java, Cochin-China, Siam, Tenasserim, Arracan, Bengal, Assam

Var. A.

*Dryophilis xanthozonius*, Kuhl?

Head less elongated and the rostral shield unusually small; upper lips in some white; besides the yellow and green lateral line, a central green; scutella in some with brown edges.

*Habit.*—*Same localities,*

Var. B.

Head above light brownish grey, tinged with sky-blue and rose-colour cheeks and lips pale rose; trunk light brownish ash, changing to pale rust colour on the tail; whitish grey on the sides; beneath buff, with a white longitudinal line on each side. Iris burnished silver; tongue white.

*Habit.*—*Pinang Hills.*

Var. C.

Upper parts saffron yellow, paler on the sides; beneath sulphur-coloured, with a lateral white line. Pupil deep burnished golden; tongue white.\*

*Habit.*—*Pinang Hills.*

This species is exceedingly numerous in the Malayan forests, both in the hills and valleys, preying upon small birds, arboreal lizards, frogs, and in early age upon insects. It may readily be distinguished from *Dryinus nasutus*, (Lacep.) (Merrem, not Bell;—Russell, I. Pl. 12, 13) by two, sometimes 3 frenals on each side. The trunk is covered by 15 longitudinal series of smooth rhomboidal scales with rounded points, imbricate, so as to appear linear; those of the tail are all broad rhombic. The anterior upper maxillary teeth gradually increase towards the sixth, which is the longest, and enclosed in a pointed fold of gingiva. The following teeth, commencing at a short interval, are short, but the last is very long with a furrow on the convex edge. The inferior maxillary teeth also increase in length towards the sixth, the longest, and are protected by a broad triangular scabbard, containing several additional loose teeth; the rest

are uniformly small, commencing at a short interval from the sixth. The palatal are uniformly very short. The largest individual of a great number measured—

	Feet.	Inch.
Length of the head,.....	0	2
Do. do. trunk,.....	4	3 $\frac{5}{8}$
Do. do. tail,.....	2	6 $\frac{1}{8}$

7 ft. 0 $\frac{1}{8}$  in.

Circumference of the neck 1 $\frac{1}{2}$ , of the trunk 2 $\frac{2}{3}$ , of the root of the tail 1 inch.

The varieties, of which B. and C. were from the hills of Pinang, are not numerous, and of a comparatively small size. The very young ones are as gentle as those of a more advanced age are ferocious. Their power of expanding the anterior part of the body and their mode of attack, have been noted under *Herpetodryas oxycephalus*.

*Gen.* LEPTOPHIS, Bell, 1825.

Rostrum obtuse, and the upper jaw projects but very slightly beyond the lower.

(2375) LEPTOPHIS PICTUS, (Gmelin.)

*Coluber pictus*, Gmelin.)

*Coluber decorus*, Shaw.

Russell, II. Pl. 26. Cumberi muken.

*Bungarus filum*, Oppel.

*Dipsas schokari*, Kuhl, (not Forskal.)

*Dendrophis chaireacacos*, H. Boie.

*Dendrophis*, Wagler.

*Dendrophis picta*, Schlegel.

Head and body above bronze with strong golden reflections; skin between the scales of the anterior part of the body alternately ultramarine and black. Lips, throat, the two lowest lateral rows of scales, and the abdominal surface silvery mother-of-pearl. From the muzzle to the root of the tail a black line, bordering above the silvery sides, which below are circumscribed by a second black line, commencing a little behind the head. Iris bright golden with a transversal black line; pupil black, circular, tongue scarlet.

Scuta 167 to 187, Scutella 109 to 149.

*Habit.*—*Malayan Peninsula and Islands.* Manilla, New Ireland, Waigiou, Amboina, New Guinea, Pulo Samao, Java, Sumatra, Cochin-China, Tenasserim, Burmah, Bengal, Assam, Coromandel.

Var. A.

[Note. The variety, *Col. polychrous*, Reinwardt, appears to inhabit neither the Malayan Peninsula nor Bengal.]

*Coluber filiformis*, Linne, (young.)

Fil, Double Raie, Lacepede, (young.)

Russell, II. Pl. 25, Mancas, Rooka, Maniar.

*Coluber bilineatus*, Shaw.

*Leptophis mancas*, Bell.

*Dendrophis maniar*, Boie.

# REPTILES OF THE

*Ahaetula bellii*, Gray, Ill. Ind. Zool.  
*Dendrophis lateralis*, Gray: Ill. Ind. Zool.  
*Chrysopelea boii*, Smith.  
*Dendrophis picta*, Var. Schlegel.  
*Dendrophis boii*, apud Cantor.

Above dull brownish black, with a light brown dorsal line; the two lowest series of scales pale greenish white, forming a lateral band, bordered above by a black line, commencing from the muzzle, more or less distinct, in some irregularly broken up on the anterior part of the body. A second faint black line below. Iris golden, in some dotted with black; tongue black.

*Habit.*—*Malayan Peninsula*. Bengal, Assam, Ceylon.

The species occurs numerous in the Malayan hills and valleys, but the contrary appears to be the case with the plain variety, which in Bengal is equally common. The following must be added to the description of M. Schlegel. The frenal shield is small, rectangular; superior labials 9, inferior 10 or 11, one præ-orbital, two, in some three small post-orbitals. The trunk is covered by 15 longitudinal series of smooth, imbricate scales; the central dorsal series is wedge-shaped, in some almost hexagonal, the next six are linear, but the lowest, as well as all the scales of the tail, are broad rhombic with rounded points. In a female were found seven coriaceous, whitish eggs of an elongated cylindrical shape, each  $1\frac{3}{8}$  inch in length. In habits and mode of attack this species resemble *Dryinus prasinus*, but it is not exclusively arborial. Probably no instance affords a more striking difference in colours, between species and variety than the present: the former with dazzling brilliant livery; the latter in its plain, dull colours. Both attain to similar size: the largest male examined was of the following dimensions:

	Ft.	Inch.
Length of the head,.....	0	$1\frac{1}{8}$
Do. do. trunk,.....	2	6
Do. do. tail,.....	1	1

3 ft.  $8\frac{1}{8}$  inch.

Circumference of the neck  $1\frac{2}{3}$ , of the trunk 2, of the root of the tail, 1 inch.

This serpent appears to possess uncommonly acute hearing, and turns its head in the direction of the sound.

(2376) *LEPTOPHIS CAUDALINEATUS*, N.S.

*Ahaetula caudalineata*, Gray: Illust. Ind. Zool.

*Dendrophis ornata*, Var. Schlegel.

Head, trunk, and tail above light brownish bronze, the scales with black edges; on the posterior half of the trunk four parallel black lines, terminating at the root of the tail, from whence commences a single central black line; sides metallic mother-of-pearl, from a short distance behind the head bordered by two parallel black lines of which the lower, the broader,

covers the lower half of the last series of scales and the lateral part of the scuta; both the lines continue to the apex of the tail. Lips, throat and abdominal surface pale metallic citrine, the tail beneath with a black central line. Iris golden, dotted with brown; pupil round; tongue bluish white, the forked part black.

*Young.*—Upper parts of the body Indian red, with metallic reflections.

Scuta 183 to 188; Scutella 105 to 110.

*Habit.*—*Penang, Singapore*.

The head large, less depressed than in the preceding species, the muzzle broad, blunt; cheeks tumid; all the shields of the crown are short and broad, except the vertical which is laterally arched, and very narrow behind. There is a single elongated post-occipital, and the rest of the hind head is covered with broad hexagonal shields. Each temple is covered by two pairs of large shields, in front of which a pair of very minute ones, bordering upon the equally small post-orbitals. The eye is large, prominent; the præ-orbital and the linear frenal proportionally small; the nostrils large, opening in the middle of the nasal; the rostral broad slightly arched beneath. The labials, 9 on each side of both jaws, resemble those of the preceding species. The mouth is large; the maxillary teeth strong, distant. In the lower jaw the anterior ones gradually increase in length till the fourth, which appears like a canine, the rest as well as the palatal teeth are all smaller, of uniform length. The chin is covered by the second pair of labials and two pairs of mentals, of which the posterior pair is elongated. The trunk is strong, less compressed than in the preceding species, with 13 series of smooth imbricate scales, of which the two lowest series are large rhombic with rounded points, the next four elongated rhomboidal (linear), and the odd central dorsal rhomboidal, not larger than the rest. The tail is covered with broad hexagonal, not imbricate, scales. The abdomen is narrow, flattened, the centre part of the scuta with strongly arched margins; the sides turned upwards and forming a continued sharp lateral ridge. The tail is slender, tapering; its vertical section nearly square.

Of this species but two individuals were observed: a young one at Singapore, an adult on the Great Hill of Pinang. The latter measured—

	Feet.	Inch.
Length of the head,.....	0	$1\frac{2}{3}$
Do. do. trunk,.....	3	$5\frac{6}{8}$
Do. do. tail,.....	1	2

4 ft. 9. in.

Circumference of the neck 2, of the trunk  $3\frac{5}{8}$ , of the root of the tail  $1\frac{1}{8}$  inch.

In its mixed arborial and terrestrial habits and in fierceness it resembles *L. pictus*, but its power



of compressing and expanding the forepart of the body is somewhat limited.

This species appears somewhat to approach to *Leptophis formosus*, (*Dendrophis formosa*, Schlegel,) but besides other distinguishing characters, it differs from that, and all other Asiatic species in having but 13 series of scales. The indifferent figure of *Ahoetula caudolineata* in Illustrations of Indian Zoology, which appears to be all which has been published concerning this species, has led M. Schlegel to suppose it was intended to represent a variety of *Leptophis pictus*, although the black outline of the head is correct.

(2377) *LEPTOPHIS ORNATUS*, (Shaw.)

Scheuchzer, T. 606.

Seba, 1. T. 94, Fig. 7.—II. T. 7, Fig. 1; T. 61, Fig. 2.

Russell, II. Pl. 2, Kalla Jin.

*Coluber ornatus*, Shaw.

*Coluber ibiboboca*, Daudin.

*Coluber ornatus*, Merrem, apud Horsfield: Life of Raffles.

*Chrysopelea paradisi*, H. Boie.

*Dendrophis ornata*, Schlegel.

*Habit.*—Bengal, Ceylon.

VAR.

Ular Chindi, Raffles.

*Dendrophis chrysochloros*, Reinwardt, (young.)

Head above intense velvety black, with three or four distant transversal bands, and numerous irregular spots of gamboge or sulphur colour; all the scales with an oval gamboge spot; from the hind head to the point of the tail a number of large rounded vermilion spots; lips, throat and abdominal surface greenish-gamboge, scuta and scutella with black margins. Iris and tongue black.

Scuta 198 to 236. Scutella 113 to 147.

*Young.*—Head, trunk and tail above greenish olive, with a series of transversal black bands in pairs; the intervals between the bands vermilion; the sides with numerous distant, irregular, small black spots; lateral part of the scuta and scutella white, the side and the anterior margin black; the centre part pale greenish yellow; scutella partially edged with black, and with a central light blue line. Tongue vermilion, the forked part black.

*Habit.*—Pinang, Malayan Peninsula. Java, Sumatra, Tenasserim, Arracan.

The variety, in which the black colour prevails, appears to be confined to the more southern countries, while that with yellow ground colour preponderating, the one described and figured by Russell, occurs in Bengal. The latter has the tongue alternately vermilion and black. Individuals without the frenal shield are not uncommon, and such was the one described by H. Boie as a distinct species (*Chrysopelea paradisi*.) It inhabits the Malayan hills and valleys, but is there, apparently less numerous than in Bengal.

The largest male observed was of the following dimensions:—

	Feet	Inch
Length of the head,.....	0	1 $\frac{1}{8}$
Do. do. trunk,.....	2	7 $\frac{3}{8}$
Do. do. tail,.....	0	11 $\frac{4}{8}$

3 ft. 8  $\frac{3}{8}$  Inch.

Circumference of the neck 1  $\frac{1}{8}$ , of the trunk 1  $\frac{7}{8}$ , of the root of the tail  $\frac{7}{8}$  inch.

The trunk is covered by 17 longitudinal series of smooth, imbricate rhomboidal scales, with rounded points. It is but seldom seen in trees; it is more frequently found on the ground in the grass, watching for its prey: lizards (*Geckonidae*,) [Note. Vide *Ptychozoon homalocephalum*, supra.] and frogs. The female has 6 to 8 white, elongated cylindrical eggs, about 1  $\frac{1}{8}$  inch in length. It differs from the other species in its being deprived of the power of compressing, and expanding the anterior part of the body, and its gentleness. The young ones never attempt to bite, the adult but seldom, and without raising vertically the anterior part of the body. In the latter, the four anterior teeth of the lower jaw are a little longer than the rest, which are uniformly small.

AQUATIC.

*Gen.* TROPIDONOTUS, Kuhl.

Head oblong ovate, rather indistinct, depressed; nostrils between the sutures of two shields; eyes moderate, with circular scales pupil, of the back lanceolate ovate, imbricate; trunk elongated, cylindrical, tail moderately long, tapering.

(2378) *TROPIDONOTUS UMBRATUS*, (Daudin,) Var.

*Tropidonotus trianguligerus*, Schlegel.

Above shining brownish, or yellowish green-olive; lips gamboge with a black oblique line between the sixth and seventh labials, a second from the orbit to the angle of the mouth: a third from the under lip to the upper part of the neck; trunk and tail with black spots, in some very minute, irregular, in others larger, approaching to quincunx order; the sides with numbers of large square or triangular scarlet spots, separated from each other by broader or narrower black vertical bands. Scuta and scutella gamboge with black margins, the latter with a black central line. Iris black with a narrow golden circle; tongue black.

Scuta 121 to 130; Scutella 76 to 84.

*Habit.*—Malayan Peninsula and Islands. Java, Bengal.

The vertical and supra-orbital shields are of an elongated narrow form; the anterior frontals triangular, longer than broad; the nostrils small, placed high on the sides, the frenal is elongated pentagonal, with the largest margin touching the præ-orbitals. Of the three post orbitals the

lowest is the longest, wedged in between the fifth, sixth, and seventh upper labials, of which the fifth is the only one which reaches the orbit; the eye is moderate, prominent; the upper labials are 9, the lower 11 on each side. The mouth is very large, the teeth small, crowded, except the two last of the upper jaw, which are longer than the rest. The trunk is slightly compressed, covered by 19 longitudinal series of scales, of which the two lowest are broad rhombic, the rest elongated rhomboidal with rounded points, those of the back lineated. The abdomen is broad arched. This variety differs in nothing but colours from *Tropidonotus umbratus*,\* (Daudin), and to judge by the description of M. Schlegel, it appears to be identical with *T. trianguligerus*. In the Malayan valleys the variety is very numerous; in Bengal it is less so, but there the species abounds in and near fresh water, where it preys upon fishes and frogs. The variety attains to a size similar to that of the species, both of which are equally fierce.

[\* Note. Russell II. Pl. 3. Dooble, young.—Pl. 5. Dora, adult.—Col. umbratus, Daudin.—Col. dora, Daud.—Col. brunneus, Hermann.—Col. atratus, Herrm.—Col. lugubris, Merrem.—*Tropidonotus umbratus* Schlegel.—*Tropidonotus dora*, apud Cantor.]

The largest individual was of the following dimensions:

	Ft.	Inch.
Length of the head,.....	0	1 $\frac{2}{8}$
Ditto. ditto. trunk,.....	1	9 $\frac{5}{8}$
Ditto. ditto. tail,.....	0	9 $\frac{3}{8}$
2 ft. 8 $\frac{2}{8}$ inch.		

Circumference of the neck 2, of the trunk 2  $\frac{1}{8}$ , of the root of the tail 1  $\frac{5}{8}$  inch.

(2379) *TROPIDONOTUS STOLATUS*, (Linnæ.

Seba, II, Tab. 9, Fig. 1, 2.

*Coluber stolatus*, Linnæ.

Le Chayque, Daubenton, Lapeyre.

Russell, I. Pl. 10, 19.

La vipere chayque, Latreille.

*Coluber stolatus*, Lin., apud Shaw, Daudin.

*Coluber taniolatus*, Daudin.

*Natrix stolatus*, Merrem.

*Tropidonotus stolatus*, Grey, Schlegel.

Head shining brownish olive with several black spots in the sutures of the shields: lips gamboge with several black oblique streaks; head and trunk brownish olive with numerous distant black transversal bands, becoming indistinct towards the tail, and intersected by two parallel bands of a pale ochre or buff, the scales of which on the anterior part of the body edged with black. Beneath gamboge or mother-of-pearl; in some the scuta with a small lateral black spot, or edged with black. Iris black with a narrow golden ring; tongue black.

Scuta 143 to 153; Scutella 69 to 79.

*Habit.*—*Pinang, Malayan Peninsula.* Philippines, Tenasserim, Bengal, Assam, Nipal, Coromandel, Ceylon, Bombay.

The species, so exceedingly numerous in Bengal, is but rarely seen in the Malayan valleys. It is of very gentle habits, and feeds upon young frogs and toads. The largest male observed was of the following dimensions:—

	Ft.	Inch.
Length of the head,.....	0	0 $\frac{7}{8}$
Do. do. trunk,.....	1	4 $\frac{2}{8}$
Do. do. tail,.....	0	5 $\frac{1}{8}$
1 ft. 10 $\frac{2}{8}$		

Circumference of the neck,  $\frac{7}{8}$ , of the trunk 1  $\frac{1}{8}$ , of the root of the tail  $\frac{5}{8}$  inch.

The female has 6 small cylindrical white eggs, each about half an inch in length.

(2380) *TROPIDONOTUS SCHISTOSUS*, (Daudin)

Russell II. Pl. 4. Chittee.

*Coluber schistosus* Daudin.

*Tropidonotus schistosus*, Schlegel.

*Tropidonotus moestus*, Cantor.

Above blackish olive, some with an indistinct blackish line from behind the eye along the side; the lips, the two lowest series of scales on each side, and the abdominal surface whitish yellow. Iris black with a narrow golden ring; tongue small, flesh coloured.

VAR.

*Tropidonotus surgens*, Cantor.

Above bright greenish olive, with a black serrated lateral line.

Scuta 148; Scutella 23.

*Habit.*—*Malayan Peninsula.* Philippines, Tenasserim, Bengal, Madagascar.

The shields of the head are short; there is but a single anterior frontal, of a triangular shape, truncated in front; the frontals are small pentagonal; the nasals nearly equal to the latter; the small semicircular nostrils almost vertical and appearing linear as they are provided with a valvule as in *Homalopsis*; from the lower part of the nostril a minute arched groove descends to the inferior margin of the shield; the frenal is small; the præ-orbital in length nearly equals the three post-orbitals. The scales of the trunk are disposed in 17 longitudinal series, of the two lowest on each side are hexagonal, each scale with a minute round protuberance near the apex; the scales of the next two series present a raised line terminating in a protuberance, but the remaining scales are elongated rhomboidal with truncated, slightly notched points, keeled, imbricate. These marks become indistinct when the integuments are about to be changed, which probably caused them to escape the notice of Russell. The species is not numerous in Bengal, and



# MALAYAN PENINSULA AND ISLANDS.

apparently less so on the Malayan Peninsula. The largest individual measured.

	Feet.	Inch.
Length of the head,...	0	1
Do. do. trunk,...	2	0 $\frac{4}{8}$
Do. do. tail,.....	0	2 $\frac{4}{8}$
	2 ft.	4 Inch.

Circumference of the neck 1  $\frac{6}{8}$ , of the trunk 2  $\frac{4}{8}$ , of the tail 1  $\frac{5}{8}$  in.

The length of the tail is very variable: in some it is contained 3  $\frac{1}{2}$ , in other 6 times in the entire length. This species is very fierce, and prepares to attack by raising the head 3 or 4 inches vertically from the ground, and it has the power of flattening and laterally expanding the skin of the anterior part of the body, like *Naja*, but in a much slighter degree. It bites uttering a faint hissing sound. Frogs and fishes form its food.

## (2331) TROPIDONOTUS CERASOGASTER.

*Psammophis cerasogaster*, Cantor.

Above yellowish brown with pale golden reflections; lighter on the sides, the scales of which in some partially edged with yellow; cheeks, lips, throat and abdominal surface cherry-coloured, with a bright yellow lateral line from the muzzle to the point of the tail. Iris and tongue cherry-coloured.

Scuta 144 to 149; Scutella 60 to 69.

*Habit.*—*Malayan Peninsula*. Bengal, Assam.

The head is elongated, depressed; sides angular, compressed; muzzle truncated; rostral broad, hexagonal, nearly vertical, arched below; the anterior frontals the smallest, next to them the frontals; the rest of the crown-shields are narrow, elongated; each occipital bordered by two pairs of elongated temporals, below which three smaller. Nasals rectangular, placed at a right angle with the anterior frontals; nostrils moderate, prominent. Besides three post-orbitals, there is a minute infra-orbital wedged in between the fifth and sixth upper labials, of which but a small portion of the sixth touches the orbit below. The lips are straight, turned up near their commissure, covered with 8 or 9 pairs of upper, 10 lower shields. The mouth is large; the teeth small, crowded, of equal length. The trunk is cylindrical, compressed, covered with 19 longitudinal series of imbricate, elongated rhomboidal scales with rounded, slightly notched points, keeled except the two lowest series on each side, which are longer than the rest, rhombic, smooth. The abdomen is broad, arched; the tail robust at the root, cylindrical, tapering to a sharp point. A solitary individual from Province Wellesley was of the following dimensions:

	Ft.	Inch.
Length of the head,...	0	0 $\frac{7}{8}$
Do. do. trunk,.....	1	5 $\frac{7}{8}$
Do. do. tail,.....	0	6 $\frac{1}{8}$

2 ft. 0  $\frac{7}{8}$  inch.

Circumference of the neck  $\frac{7}{8}$ , of the trunk 1  $\frac{4}{8}$ , of the root of the tail  $\frac{7}{8}$  inch.

In Bengal this species is not numerous. It is very fierce, attacks in a vertical attitude but without expanding the anterior part of the body. Its food is that of the preceding. The elongated angular head makes this species resemble a *Psammophis*.

## (2332) TROPIDONOTUS JUNCUS, N.S.

Head above shining light brown, lips and throat gamboge; from the angle of the mouth an oblique gamboge band, both joining under a sharp angle on the neck; trunk and tail dull greyish olive, with a series of distant rounded whitish spots on each side; each scutum and scutellum with a small black spot on the sides, which as well as their anterior margins are minutely dotted with brown. Iris black with a golden ring; tongue, small, greyish.

Scuta 157; Scutella 88.

*Habit.*—*Pinang*.

The head is elongated ovate, with the sides angular, compressed; the muzzle truncated; the rostral shield moderate, square, deeply arched beneath, vertically fixed; the anterior frontals small, tetragonal; the frontals larger, angularly bent over the side, where they border the small square frenal; the other crown shields are rather small, the occipitals on each side bordered by small elongated shields, like the rest of the temples; the eyes large, prominent; præ-orbital one; post orbitals three; nasal rectangular; nostrils lateral, large, rounded; upper labials 9, of which the fourth, fifth and sixth border the orbit; lower labials 11; mentals two pairs, elongated. The lips are slightly arched, the mouth wide; the teeth small, crowded; the last upper maxillary tooth longer than the rest. The trunk is very slender, cylindrical, with the centre of the back raised, forming a sharp ridge, the sides bulging near the abdomen, which is arched. The scales are imbricate, very elongated rhomboidal with the apex notched, except the two lowest series on each side, which are broad rhombic; they are all sharply keeled, and disposed on the anterior part of the trunk in 19, on the middle part in 17 longitudinal series. The tail elongated, cylindrical, very slender, tapering to a fine point. A single individual observed on the Great Hill of Pinang by W. S. Lewis, Esq. was of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	0 $\frac{6}{8}$
Do. do. trunk,....	1	7
Do. do. tail,.....	0	7 $\frac{4}{8}$

2 ft. 3  $\frac{1}{8}$  Inch.

Circumference of the neck  $\frac{7}{8}$ , of the trunk 1  $\frac{1}{8}$ , of the root of the tail  $\frac{7}{8}$  inch.

Like most of the Asiatic species of this genus, the present is of fierce habits. It twice appro-

vokedly bit a wood cutter who happened to pass it. The bite, of course, was productive of no consequences except a slight momentary pain. The very slender make and the elongated tail are characters which approach this species to the arboreal Colubridæ.

*Gen. HOMALOPSIS*, apud Schlegel.

(Erpeton, Lacepede, 1803.—*Rhinopirus*, Merrem, 1820.—*Pseuderyx*, Fitzinger, 1826.—*Homalopsis*, Kuhl, 1827.—*Cerberus*, Cuvier, 1829.—*Hypsirhina*, Wagler, 1830.—*Hydrops*, Wagler, 1830.—*Helicops*, Wagler, 1830.—*Potamophis*, Cantor, 1836.)

*Homalopsis*, Kuhl. Nostrils opening vertically in the centre of the small nasals, with a valvule, crown shields small; dorsal scales imbricate keeled; chin with small shields, throat scaly; labials narrow; abdomen with scuta; tail short, tapering to a sharp point; beneath with scutella.

(2383) *HOMALOPSIS RHINCHOPS*, (Schneider.)

Seba, II. T. 15. F. 3.  
Hydrus rhynchops, Schneider.  
Russell, I. Pl. 17. Karoo Bokadam.  
Russell II. Pl. 40, (young)  
Boa moluroides, Schneider.  
Elaps boæformis, Schneider.  
Enhydrus rhynchops, Latreille.  
Hydrus cinereus, Shaw.  
Hurria schneideriana Daudin.  
Coluber schneiderianus, Daudin.  
Coluber cerberus, Daudin.  
Python rhynchops, Merrem.  
Python elapiformis, Merrem.  
Python molurus, Merrem.  
Coluber obtusatus, Reinwardt.  
Cerberus (*Homalopsis obtusatus*), Cuvier.  
*Homalopsis schneiderii*, Schlegel.  
Cerberus cinereus, Cantor.

*Young*.—Ash-coloured above, the head with black irregular spots and a short black line behind the eyes; trunk and tail with numerous distant black transversal bands; lips and throat white, dotted with black; the three or four lowest series of lateral scales white; beneath white with a black undulating band, frequently interrupted.


*Adult*.—Ash, lead-coloured or blackish grey with the black marks indistinct or invisible. Iris black; pupil elliptical, vertically contracted by the light; tongue very small, pale greyish.

Scuta 143 to 156; Scutella 49 to 72.

*Habit*.—*Malayan Peninsula and Islands*. New Guinea, Amboina, Timor, Sarapua, Java, Sumatra, Tenasserim, Bengal, Coromandel.

The shields of the upper part of the head, which appear to be of a constant form, are the nasals, the frontals, which enclose the small pair of triangular anterior frontals, (sometimes soldered together,) and the supra-orbitals. The rest are broken up in small, irregular, smooth pieces, differing in outline in each individual. The small eye, placed in a partly vertical, partly lateral

position, is surrounded by a præ-orbital a post-orbital and two or three infra-orbitals. The frenal is comparatively, large, irregularly tetragonal. The anterior seven upper labials are narrow, very high; the posterior five or six each divided in two. A similar arrangement is observed in the inferior 13 or 14 of which the posterior 6 or 7 are very small. On the chin there is a pair of elongated shields immediately behind the 2 pair of labials. The posterior upper maxillary tooth is longer than the rest, and furrowed. The three anterior teeth in the lower jaw are longer than the rest. The trunk is covered with imbricate, finely lineated and keeled scales, of a rhomboidal form with rounded points, disposed on the anterior part in 25, on the posterior part in 17, longitudinal series. The tail is robust, tapering, and prehensile. In the Malayan countries this species occurs in numbers in rivers, estuaries, and occasionally along the sea coasts. It feeds upon fishes. Single individuals measuring between 3 and 4 feet in length, are of very rare occurrence. Of a great number the largest was of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	1 $\frac{2}{3}$
Do.  trunk,.....	2	3
Do. do. tail,.....	0	7

2 ft. 11  $\frac{2}{3}$  Inch.

Circumference of the neck 1  $\frac{7}{8}$ , of the trunk 3  $\frac{3}{8}$ , of the root of the tail 1  $\frac{3}{8}$  inch. It is of peaceful habits; the female brings forth 8 living young, each of which measures from 7 to 7  $\frac{1}{2}$  inches in length.

(2383b) *HOMALOPSIS BUCCATA*, (Linne.)

Scheuchzer, Pl. 660. Fig. I, (Young.)  
Seba, II. Tab. 12. F. 1;—T. 1;—T. 21.  
F. 3, (Young.)  
*Coluber buccatus*, Linne.  
*Coluber monilis*, Linne.  
*Coluber subalbidus*, Boddaert, apud Gmelin.  
Le Demicollier, Lacepede.  
*Vipernkopfige Natter*, Merrem.  
*Coluber buccatus*, apud Shaw.  
Russell, II, Pl. 33, (Young.)  
*Coluber viperinus*, Shaw.  
*Coluber buccatus*, Daudin.  
*Coluber horridus*, Daudin.  
*Echidna semifasciata*, Merrem.  
*Homalopsis buccata*, Schlegel.

*Young*.—Ground colour, white or buff, becoming brownish on the crown shields, hind head and lips; on the muzzle an angular mark, with the apex between the frontals, Van Dyke brown or chestnut; an oblique streak proceeds from the eye over the cheek, joining a broad cervical band, which, sending a narrow straight line to the occipitals, gives the upper part of the head a heart-shaped outline; the back and tail with numerous broad transversal brown bands, between which the ground colour appears in the shape of white,



often interrupted, narrow bands, and of a white spot in the centre and on each side of the brown bands. The latter reach but as far as the lowest four or five series of scales on the sides, which as well as the throat and abdomen are white; on each side of every third or fourth scutum a brown spot; Scutella black, or white closely spotted with black.

*Adult.*—The livery of the young indistinct: the ground colour of the upper parts pale greyish brown or olive; the bands of a darker shade of the same colour, edged with black; sides and beneath impure buff, the brown marks pale. Pupil black, elliptical, vertically closed by the light; tongue small whitish.

Scuta 155 to 167; Scutella 73 to 89.

*Habit.*—*Pinang, Malayan Peninsula.* Java.

From the small, nearly vertically opening nostrils, proceeds a furrow downwards to the lower margin of the nasal. The anterior frontal is either entire and of a large rhombic shape, or consisting of two triangular shields; the frenal is elongated, rectangular, the small eye is situated more laterally than in the preceding species, and surrounded by two post-orbitals, one præ-orbital, and two infra-orbitals. The seven anterior upper labials are very high, the posterior five or double; of sixteen or seventeen lower labials, the nine anterior are the highest. The last tooth in the upper jaw is furrowed, and as well as the 3 or 4 anterior palatal and inferior maxillary teeth, longer than the rest. The folds of gingiva enveloping the teeth are very ample, and contain in addition to the fixed, numerous, 5 to 6 deep, accessory teeth. The chin is covered by four pairs of elongated scales, decreasing in length from the centre towards the labials. The scales of the trunk are rhombic, imbricate, slightly keeled and finely lineated, disposed on the anterior part in 39, on the posterior in 25 longitudinal series. The tail is robust, tapering and somewhat prehensile. The largest individual observed was of the following dimensions:

	Feet.	Inch.
Length of the head, . . . . .	0	$1\frac{1}{2}$
Do. do. trunk, . . . . .	1	11
Do. do. tail, . . . . .	0	7
		<hr/>
		2 feet. $7\frac{1}{2}$ in.

Circumference of the neck 2, of the trunk  $3\frac{1}{2}$ , of the root of the tail  $1\frac{1}{2}$  inch.

In the valleys of Pinang and on the opposite continent, this species is numerous in streamlets, tanks and in the irrigated fields, where it feeds on fishes. The young ones are very gentle, and the old but seldom bite. In their movements they are sluggish, and on dry land very awkward. The female brings forth six or eight living young

at the time, each between 7 and 8 inches in length.

Hypsirhina, Wagler. Resembling Homalopsis in the form and situation of the nostrils, the integuments and general appearance of the head, trunk, and tail; but the dorsal scales are smooth, and the labials are square, equal; (frenal one.)

(2383c) HOMALOPSIS SIEBOLDI, Schlegel.

Seba, II, Tab. 46, Fig. 2?

*Young.*—Ground colour, white, which on the upper part of the head appears in the shape of two lines diverging from the muzzle over the eyes to the sides of the head. From each side of the vertical shield a line diverging towards the hind head, where it branches in two, sending a portion transversely to the throat, and another to the upper part of the neck joining under an angle that of the opposite side; on the trunk and tail the ground colour shows itself as numerous narrow, transversal bands, which on the centre are frequently interrupted and placed in quincunx series: on the sides the bands are bipartite. The intervals between the ground colour are chestnut with dark brown edges. The lips and the abdominal surface white with numerous pale brown irregular spots. Iris greyish with a transversal black bar; pupil elliptical tongue white.

[Note. *Adult.*—A preserved specimen in the Museum of the Asiatic Society differs from the young in having the head above of a uniform colour, while the rest of the peculiar design is retained. The ground colour is yellowish white; the brown of the young is faded to a dull lead grey.—Scuta 156, Scutella 55.—Dimensions: head  $0\frac{7}{8}$  inch; trunk 1 ft.  $8\frac{2}{3}$  inch; tail  $3\frac{7}{8}$  inch = 2 ft. 1 inch.—Circumference of the neck,  $1\frac{7}{8}$ , of the trunk  $2\frac{5}{8}$ , of the root tail,  $1\frac{1}{2}$  inch. The locality from whence this specimen was obtained, is not known: Bengal is given by M. Schlegel.]

Scuta 155; Scutella 48.

*Habit.*—*Malayan Peninsula.* Bengal.

The description is taken from a solitary young individual, which was killed in Province Wellesley. It measured,

	Inch.
Length of the head, . . . . .	$0\frac{4}{8}$
Do. do. trunk, . . . . .	$5\frac{7}{8}$
Do. do. tail, . . . . .	$1\frac{5}{8}$

---

8 inch.

Circumference of the neck  $\frac{5}{8}$ , of the trunk  $\frac{7}{8}$ , of the root of the tail  $\frac{4}{8}$  inch.

In livery and in general appearance this species resembles *H. buccata*, from which it differs in the following particulars. Both the upper and the lower rostral shield are very small; the anterior frontals are much broader than long,

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each like a small transversally placed cone, surrounded by the nasal, (with a slit towards the lower margin,) the tetragonal frenal, and behind, by the frontal. The vertical in extent nearly equals each of the short occipitals. The eye is rather large, prominent, surrounded by a single elongated, arched præ-orbital and two post-orbitals, of which the inferior is the larger, bordering the fifth and sixth upper labials of the latter there are eight on each side: the fourth borders the eye below, the two posterior are broken up in small pieces. Of the 11 or 12 pairs of lower labials, the four nearest the angle of the mouth are the smallest. The chin is covered by three pairs of oval shields, of which the anterior is the largest, and by some minute scales. The mouth is small; the teeth minute, uniform, except the last upper maxillary tooth, which is the longest with a furrow on the convex margin. The back is slightly angular in the centre, much depressed; the sides bulging; the abdomen narrow. The anterior part of the trunk is covered with 29, the posterior with 19 series of small smooth, imbricate scales, all rhombic with rounded points. The tail is tapering and compressed.

## (2383d) HOMALOPSIS ENHYDRIS. (Schneider.)

Russell, l. Pl. 30. Mutia Pam, Ally Pam.

Hydrus enhydris, Schneider.

Enhydris cœrulea, Latreille.

Hydrus alrocœruleus, Shaw.

Coluber pythonissa, Daudin.

Homalopsis aer, \* Boie.

Hypsirhina, Wagler.

Potamophis lusingtonii, Cantor.

Homalopsis aer, Schlegel.

Homalopsis olivaceus, Cantor.

[\* Note. This specific name of aer is singularly ill chosen, as the denomination "ular ayer," (water-serpent,) is applied by the Malays to all fresh water serpents. The word "ayer" applied to a single species is as eligible as would be "aqua," eau or "wasser."]

Iridescent dark greenish or brownish-olive above; the scales edged with black; in some two parallel light greyish lines from between the eyes to the tip of the tail; the lower half of the sides pale greenish or brownish-grey; lips and throat white, edged and dotted with black abdominal surface white or buff, with a greenish or brownish line on each side, and a black central line dividing the scuta and scutella. Iris greyish or pale olive; pupil circular; tongue whitish.

*Young*: with lighter and more strongly iridescent colours than the adult.

Scuta 148 to 167; Scutella 53 to 71.

*Habit.*—*Malayan Peninsula and Islands.* Java, Tenasserim, Bengal, Coromandel.

The head is small, ovate, scarcely distinct; the nostrils are hemispherical, with a slit towards the external margin of the shields; the single anterior frontal is small, rhomboidal, much broader than long; the eye is ra-

ther large, prominent, lateral and surrounded by two rather broad post-orbitals, one or two narrow præ-orbitals, and beneath by the fourth upper labial; the frenal is small, rhombic. The external margins of the occipitals are bordered by three elongated shields, and each temple by five similar. The eight upper labials are larger than the ten lower. The chin is covered by two central pairs of elongated shields, between which and the labials is, on each side, a single very elongated shield. The mouth is small, the teeth minute, numerous and equal, except the last tooth of the upper jaw, which is longer than the rest and furrowed. The trunk is very robust, broadly depressed; the sides obliquely compressed, and the abdomen very narrow, flattened. The scales are broad rhomboidal with rounded points, slightly imbricate, and disposed on the anterior part in 25, in the middle in 21, and near the tail in 19 longitudinal series. The tail is very slender, somewhat compressed, tapering and prehensile. The largest individual was of the following dimensions:—

	Fect.	Inch.
Length of the head,.....	0	1
Do. do. trunk,.....	1	5 $\frac{3}{8}$
Do. do. tail,.....	0	5 $\frac{2}{8}$
		2 feet.

Circumference of the neck 1 $\frac{2}{8}$ , of the trunk 2 $\frac{2}{8}$ , of the root of the tail  $\frac{7}{8}$  inch.

Numbers of this species may be seen in rivers, as well as in irrigated fields and estuaries, preying upon fishes, which however it refuses in a state of captivity. It is of timid and peaceful habits. A large female, after having been confined upwards of six months in a glass vessel filled with water, brought forth eleven young ones in the manner noted above under *Acrochordus javanicus*. During the progress she lay motionless on the bottom of the vessel, the anterior part of the abdomen was retracted towards the vertebral column, while the muscles of the posterior part were in activity. Shortly after the parturition she expired under a few spasmodic movements, and also two of the young ones died in the course of about two hours, after having, like the rest, shed the integuments. In length they varied from 6 inch to 6 $\frac{3}{8}$ . The living nine presented a singular appearance: they remained a little way below the surface of the water coiling themselves round the body of an adult male, which was also kept in the vessel, occasionally lifting the heads above the surface to breathe, at the same time resisting the efforts of the senior to free himself. Fishes and aquatic insects were refused, in consequence of which the young ones expired from inanition in the course of less than two months.



## MALAYAN PENINSULA AND ISLANDS.

(2383e) HOMALOPSIS PLUMBEA, Boie.

Hypsirhina, Wagler.

Hypsirhina hardwickii, Gray: Illust. Ind. Zool.

Homalopsis plumbea, Schlegel.

Iridescent dark brownish, or greyish-olive above, uniformly or with small irregular black spots; the two or three lowest series of scales yellowish, each scale spotted or edged with brown; lips and throat yellow; scuta and scutella yellowish white, the former in some partially edged with black, the latter with a black central zig-zag line; iris grey; pupil elliptical, vertically contracted by the light; tongue whitish.

Scuta 125 to 126; Scutella 36 to 44.

*Habit.*—Pinang. Java.

The head is broad, ovate, depressed; the muzzle blunt, the nostrils small triangular, with a slit towards the lower margin of the nasal; the single anterior frontal broad triangular; the rest of the crown shields are of normal form. The eye is small, placed in a half lateral half vertical position, enclosed by two post-orbitals, one elongated præ-orbital, and beneath by the fourth upper labial; the frenal is very small, tetragonal; the upper labial eight, rather high; lower labials ten; on both jaws the shields increase in size towards the angle of the mouth. The chin is covered with two pairs of elongated shields and a few gulars. The mouth is small; the posterior upper maxillary tooth longer than the rest, furrowed, and the anterior lower maxillary teeth also exceed the following. In addition to the fixed teeth there are several accessory series. The trunk is nearly cylindrical, slightly depressed, covered with small rhombic scales, smooth, and not imbricate, disposed on the anterior part in 19, on the posterior part in 17 longitudinal series. The tail is short, conic, tapering and slightly prehensile. Two individuals, taken at different times in rivulets in the valley of Pinang, in habits resembled *H. rhynchops*. The larger was of the following dimensions:

	Ft.	Inch.
Length of the head,.....	0	$1\frac{1}{8}$
Do. do. trunk,....	1	5
Do. do. tail,.....	0	$2\frac{3}{8}$
	1 ft.	$8\frac{7}{8}$ in.

Circumference of the neck  $1\frac{5}{8}$ , of the trunk  $2\frac{1}{8}$ , of the root of the tail  $1\frac{1}{8}$  inch.

(2383f) HOMALOPSIS LEUCOBALIA, Schlegel.  
Var. (See Plate XL. Fig. 5.)

*Young.*—Above light brownish olive or greenish grey with single irregular distant brown spots; lips and throat whitish yellow; the lowest three or four lateral series of scales, and the abdominal surface greenish white or pearl-coloured.

*Adult.*—Uniformly blackish olive above, otherwise like the young. Iris dark brown; pupil elliptical, vertically contracted by the light. Tongue whitish.

Scuta 130 to 143; Scutella 26 to 37.

*Habit.*—Pinang, Malayan Peninsula.

The head is very broad, depressed, and the muzzle black; the rostral broad, hexagonal, very slightly arched beneath; the superior margin borders the single small elongated anterior frontal, which is of a narrow hexagonal form, broader behind, where it is wedged in between the two broad frontals. The nasals are rather large; nostrils small crescent-shaped, the vertical very broad, short, hexagonal; occipitals large, elongated with a pair of very broad shields on each side, below which the temple are covered by three smaller shields. The eye is very small, in a half vertical position, with two post-orbitals, one præ-orbital, which extends to the large oval nasal; frenal none, or, when present, excessively minute. Of the five large upper labials, the anterior is the smallest and borders the nasal; the second the præ-orbital, the third the orbit, and the lower post-orbital, the fourth and fifth the temporals. The lower rostral is very small, triangular. The seven or eight inferior labials are much smaller than the upper. The two pairs of mentals are very short. The mouth is small; the teeth are very strong, short and of nearly equal size, except the furrowed last upper maxillary tooth and the anterior teeth of the lower jaw, which are longer than the rest. The trunk is robust, back slightly raised in the centre, the sides sloping, their lower half compressed, the abdomen broad, arched. The scales are smooth, rhombic with rounded points, slightly imbricate; those of the sides have the points bent inwards and firmly adhering to the skin, so as to appear hexagonal. On the anterior part of the trunk they are disposed in 27, on the posterior in 25 longitudinal series. The tail is short, robust, tapering and somewhat prehensile. In the male the sides are compressed, very high in the middle; and the lower surface is flattened, very broad, more so than in the posterior part of the abdomen. In the female it is shorter, the sides less high, and the lower surface less broad. The largest male of a considerable number was of the following dimensions:

	Feet.	Inch.
Length of the head,....	0	$0\frac{7}{8}$
Do. do. trunk,.....	1	$10\frac{3}{8}$
Do. do. tail,.....	0	$3\frac{6}{8}$
	2 ft.	$1\frac{7}{8}$ inch.

Circumference of the neck  $1\frac{7}{8}$ , of the trunk  $2\frac{1}{8}$ , of the root of the tail  $1\frac{1}{8}$  inch. With the exception of its colours, the present offers no difference from *H. leucobalia*, from the rivers of Timor. At Pinang it is numerous not only in

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fresh water and estuaries, but in the sea at some distance from the shore, where it sometimes occurs in fishing nets. It is of sluggish, not fierce habits, and feeds upon fishes and crustacea, aquatic and pelagic. In a young female the oviduct enclosed 4 white cylindrical eggs, which when they were observed contained but yolk; each measured about an inch in length.

(2383g) HOMALOPSIS HYDRINA, N.S. (See Plate, Fig. 4.)

*Adult.*—Ash-coloured above with a few scattered black spots on the neck; the back and tail with numerous transversal black bands; the lips, sides and abdomen uniformly pearl-coloured. Iris ashy; pupil elliptical, vertically contracted by the light; tongue small, whitish.

Scuta 161; Scutella 34.

*Young.*—Resembling the adult, but the ash colour of a much lighter shade.

Scuta 153; Scutella 35.

*Habit.*—Sea off Pinang, and the Malayan Peninsula.

The head is moderately distinct, elongated, depressed, oval with rounded, blunt muzzle; the rostral shield moderate, hexagonal; its lower margin with a central minute tubercle, on each side of which a triangular impression. The upper margin of the minute triangular lower rostral presents a central cavity, and two lateral elevations fitting into the margin of the upper rostral. A similar contrivance in the pelagic serpents enables them hermetically to close the mouth. As in *H. leucobalia*, the single small anterior frontal is elongated hexagonal, broader behind, and enclosed by the rostral, the nasals, and the frontals. Although the nasals are placed laterally, the small arched linear nostrils open vertically, and send a slit to the posterior margin of the shield; the frontals are hexagonal, smaller than the latter; the vertical is the longest of the crown-shields, very narrow, hexagonal, pointed at both extremities, but broader behind; the supra-orbitals are small, narrow; the occipitals are broken up in minor shields: viz. two post-occipitals, in size equal to the occipitals, and a minute conical inter-occipital, enclosed by the four shields, with the broader extremity wedged in between the occipitals. Each temple is covered with two pairs of large shields, of which the lower borders the fifth, sixth, and seventh upper labials. The eye is very minute, prominent, almost vertically placed, surrounded by two post-orbitals, of which the lower is broad pentagonal, meeting beneath the elongated single oblique præ-orbital. Thus none of the upper labials border the orbit. The frenal is moderate, pentagonal. Of the seven upper labials the anterior three pairs are much smaller than the rest

as to make the margin of the lip very bulging in a downward direction. The lower ten or eleven labials are smaller than the upper, except the sixth, which is the largest. The chin with two pairs of shields of which the anterior is very elongated; the throat with numerous minute scales. The mouth is small, the dentition resembles that of *Homalopsis leucobalia*, Var. The trunk would be orbicular, but for the narrow flattened abdomen, the scuta of which are angulated, forming on each side a sharp ridge. The scales are very small, smooth, on the neck disposed in 33, successively in 37, but near the root of the tail in 29 longitudinal series. Those of the back are rhomboidal with rounded points; those of the sides lanceolate with the point bent inwards, so as to appear truncated; each scale leaving a small square interval, in which appears the naked skin. The tail is short, much compressed, tapering and slightly prehensile. In the male the sides are very high, and the lower surface very broad, as noted under *H. leucobalia*, Var. On the broadest part there are as many as 21 longitudinal series of scales. In the female this organ is shorter, the sides less high, and the abdomen less broad.

Of three individuals observed, two were captured in fishing stakes placed in the sea off the shores of Keddah, a third was washed on shore by the waves on the coast adjoining my house at Pinang. The largest male was of the following dimensions:

	Ft.	inch.
Length of the head, . . . . .	0	0 $\frac{5}{8}$
Do. do. trunk, . . . . .	1	4 $\frac{4}{8}$
Do. do. tail, . . . . .	0	2 $\frac{2}{8}$
	<hr/> 1 ft. 7 $\frac{3}{8}$	

Circumference of the neck  $\frac{9}{8}$ , of the trunk 1 $\frac{1}{8}$ , of the root of the tail  $\frac{7}{8}$ , of the middle of the tail 1; two eighths from the apex  $\frac{3}{8}$  inch.

It moved actively and without difficulty on the sand, and did not offer to bite. In one examined the stomach contained remains of two small pelagic fishes. In general appearance and colours the present is more closely allied to the pelagic serpents than any other known species. Whether it exclusively inhabits the sea, or, like *Homalopsis rhynchops*, *enhydrus*, and *leucobalia*, as an occasional visitor, must be a matter of future investigation.—*Journal of the Asiatic Society of Bengal*, page from 897 to 952.

### VENOMOUS SERPENTS.

FAM. VIPERIDÆ, BONAPARTE.

SUB-FAM. BUNGARINÆ, Bonaparte.

### TERRESTRIAL.

(2384) Gen. ELAPS, Schneider.



# MALAYAN PENINSULA AND ISLANDS.

ble; mouth and eyes small, trunk elongated, throughout of nearly equal circumference, very smooth; tail short, tapering, beneath with scutella.

(2385) *ELAPS MELANURUS*, (Shaw.) See Plate XL, Fig. 6.)

Russell I. Pl. 8. (young).

*Coluber melanurus*, Shaw (young).

*Vipera trimaculata*, Daudin, (young).

*Elaps trimaculatus*, { Wagler } (Young.)  
Merrem, apud { Schlegel }

Strongly iridescent light bay above; from the muzzle a longitudinal black band, joining on the neck a broader transversal black band with whitish edges; a short oblique black line behind the eye, and a similar from the nostril to the middle of the upper-lip; on each side of the anterior part of the back a series of distant black dots; a broad black transversal band with whitish edges, at the root of the tail; a second similar, at a short distance from the apex; lips, throat and the anterior part of the abdomen iridescent yellowish white, changing to yellow or orange on the posterior part; the tail beneath bluish white, with large irregular black spots. Iris black; pupil circular; tongue black.

Scuta 205 to 247; Scutella 24 to 32.

*Habit.*—*Malayan Peninsula*: Tenasserim, Nerva, (Coromandel.)

In general appearance this species nearest approaches *Elaps intestinalis*, (Laurenti), but the eye is comparatively larger, while the nearly equilateral, hexagonal, vertical shield is smaller in the present. The eye is surrounded by two post-orbitals, one præ-orbital, and beneath by the third and fourth upper labials. Of the latter seven pairs cover the jaws. The trunk is throughout covered by 13 series of smooth, sub-imbricate, rhombic scales. The one described by Russell, hitherto the only describer from nature, was a young animal. A similar, upwards of a foot in length, was killed in Province Wellesley. But the late Mr. Griffith in one of his botanical excursions, captured an individual of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	0 $\frac{5}{8}$
Do. do trunk,.....	1	10 $\frac{3}{8}$
Do. do tail,.....	0	1 $\frac{4}{8}$
	2 ft.	0 $\frac{3}{8}$ in.

Circumference of the trunk 1 inch.

(2386) *ELAPS INTESTINALIS*,\* (Laurenti,) Var.

\* *Note.* Syn. Sebaii, Pl. 2, Fig. 7.—*Aspis intestinalis*, Laurenti—*Coluber intestinalis*, Gmelin.—Russell II, Pl. 19.—*Elaps furcatus*, Schneider.—*Coluber intestinalis*, Shaw.—*Vipera furcata*, Daudin—*Elaps furcatus*, Schneider, apud Wagler, Schlegel.

*Habit.*—Java, Malwah (Central India)

Grant obtained from Saugor, Malwah, contained a single specimen.

Syn.—*Maticora lineata*, Gray: Ill. Ind. Zool.  
*Elaps furcatus*, Schneider, Var. apud Schlegel, Cantor.

*Young and Adult.*—Head above light chestnut; lips and throat yellowish white, upper lips spotted with black; from the hind head to the tip of the tail a vermilion line, on each side of which a narrow, serrated, black line. On the nearest two longitudinal series of scales the ground colour appears as a reddish light grey longitudinal line, beneath bordered by an equally broad black line, under which a narrow buff-coloured line, bordered by a black serrated line, the teeth of which are directed downwards, wedged in between the lateral margins of the scuta and scutella. Scuta alternately pale citrine and iridescent black, the latter colour occupying three to four scuta together, while the former rarely appears on more than two. Tail above with two or three distant black transversal bands; beneath vermilion, with a continuation of the superior transversal bands. Iris black, pupil circular; tongue black.

Scuta 223 to 238; Scutella 24 to 26.

*Habit.*—*Pinang, Singapore, Malayan Peninsula.* Sumatra.

Excepting the colours, this variety otherwise perfectly agrees with *E. intestinalis*. The neck is covered by 15, the rest of the trunk by 13 longitudinal series of smooth, not imbricate rhombic scales. It is of no uncommon occurrence in the hills of Pinang, at Malacca, and at Singapore. The largest individual was of the following dimensions:

	Ft.	Inch.
Length of the head,.....	0	0 $\frac{3}{8}$
Do do trunk,.....	1	10
Do do tail,.....	0	1 $\frac{4}{8}$
	1 ft.	11 $\frac{7}{8}$ inch.

Circumference of the trunk 1 $\frac{3}{8}$  inch.

(2387) *ELAPS NIGROMACULATUS*, Cantor. (See Plate XL, Figure 7.)

Syn.—*Calliophis gracilis*, Gray: Ill. Ind. Zool. (Young).

“Probablement nouvelle espece d’*Elaps*,” Schlegel: Essay, p. 451 (1).

*Elaps nigromaculatus*, Cantor: Spicil.

Head above yellowish brown, each shield with a pale black spot in the middle; lips and throat yellowish white, spotted with pale black. Ground colour of the trunk and tail reddish light grey, longitudinally divided by a central black line with small round, black, white edged spots about an inch apart; on each side two parallel black lines, the lower of which bordering the two lowest series of scales of the sides, which are white edged with black, so as to appear longitudinally

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black and white lines are on each side intersected by a series of large rounded (the anterior pair elongated), black spots with white edges, placed in pairs, opposite each other, but in quincunx order with the smaller black spots of the dorsal line. Beneath alternately yellowish white or pale citrine, and iridescent black, both colours nearly equally divided. Tail at the root, and near the apex with a broad transversal black band, edged with white, both continued on the vermilion lower surface, and there, between them, a third similar band. Iris black, pupil round; tongue bluish grey.

*Young*.—Marked like the adult, but the ground colour of the back and tail inclines to light reddish brown.

Scuta 238 to 311; Scutella 21 to 28.

*Habit*.—Pinang, Singapore.

In general appearance this species very closely resembles *Elaps intestinalis*, from which it is distinguished by the following characters. [The (magnified?) representation of the head of "*Calliophis gracilis*," Fig. 2. *Ind. Zool.*, is in every particular incorrect.] The two pairs of frontal shields are remarkably disproportionate, the frontals (proper) being much the larger: next to the occipitals they are the largest of the crown-shields. The nearly equilateral, hexagonal vertical, and the supra-orbitals are remarkably small: more so than in any other species of this genus. The occipitals are very narrow elongated; their external margin bordered by two pairs of shields of which the anterior, the larger, cover the temples, and is beneath bounded by the fifth and sixth upper labials. The eye is sunk, excessively minute, surrounded by two small post-orbitals; beneath by the third and fourth upper labials, and by a single narrow triangular præ-orbital. The latter is placed obliquely, so that the downwards pointed apex meets the linear posterior part of the nasal, or as it is considered by some, the frenal. The nostrils are comparatively large. The upper labials number six on each side: the two posterior are the largest. The chin is covered by two pairs of elongated narrow shields, externally bordered by the third and fourth, the largest of the six inferior labials. The gular scales are more numerous than those of *E. intestinalis*. The neck is covered by 15, the trunk by 13 longitudinal series of smooth rhombic scales with rounded points. • This species is of no uncommon occurrence in the hills of Pinang. The largest individual was of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	0 $\frac{3}{8}$
Do. do. trunk,.....	2	1 $\frac{3}{8}$
Do. do. tail,.....	0	1 $\frac{3}{8}$

2 ft. 3  $\frac{3}{8}$  inch.

Circumference of the trunk, 1 inch.

(2388) *ELAPS BIVIRGATUS*, Kuhl, VAR.

[Syn.—*Erpetologie de Java*, Pl. 44.—*Elaps bivirgatus*, apud Schlegel.]

*Habit*.—Java, Sumatra.

Syn.—*Elaps flaviceps*, Cantor, Spicil.

*Elaps flaviceps*, apud J. Reinhardt: Beskrivelse, &c.

Head, lips and throat vermilion; trunk above brilliant iridescent, intense black, most of the scales partially edged with azure, not however sufficiently to produce regular network; the two lowest series of scales on each side azure, forming a continued lateral band, longitudinally divided by a white zig-zag line, produced by the scales being partially edged with white. Beneath vermilion; each scutum with two lateral, square black spots, forming a continued black band bordering the azure. Tail above with a narrow black dorsal line; sides and scutella vermilion. Iris and tongue black.

Scuta 248 to 277; Scutella 38 to 45.

*Habit*.—Pinang, Malayan Peninsula.

In colours the young ones resemble the adult. The neck is covered by 15, the trunk by 13 longitudinal series of smooth rhomboidal scales. The anterior part of larynx, instead of adhering to the upper part of the membranous sheath enclosing the tongue, presents the peculiarity of being free and projecting in the mouth like a small tube.

Of four individuals observed, the three were from the hills of Pinang. The largest was of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	0 $\frac{3}{8}$
Do. do. trunk,.....	2	7 $\frac{6}{8}$
Do. do. tail,.....	0	3 $\frac{3}{8}$

2 ft. 11  $\frac{5}{8}$  in.

Circumference of the trunk, 1  $\frac{3}{8}$  inch.

*Elaps intestinalis*, Var, *E. nigromaculatus*, and *bivirgatus*, Var, appear at Pinang, exclusively to inhabit the hills at a considerable elevation, but on the Malayan peninsula, and at Singapore they occur in the valleys. Although not numerous, they cannot be said to be of rare occurrence. They are strictly terrestrial, and have their hiding places under the roots of trees, and in the crevices of rocks. They are sluggish, awkwardly dragging their long slender bodies, and they are generally observed lying motionless, with the body thrown in many irregular folds, but not coiled. Although they are diurnal, their sight from the minuteness of the pupil, appears to be as defective as their sense of hearing, and they may be closely approached, without apparently their being aware of danger. If touched with a stick, they make a few strenuous efforts to slide away, but they



soon stop, and if further pursued, they make some irregular spasmodic-like movements, but they have not been observed to bite. An adult *Elaps bivirgatus*, Var. was on a single occasion seen to raise the head vertically about two inches from the ground. In captivity they refuse food and water, and die in a short time from inanition. Of a number examined, only one of the latter species had in the stomach the remains of a small serpent, the genus of which could not be determined. M. Schlegel has observed *Calamaria* in the stomach of *Elaps intestinalis*. In the peculiar distribution of colours, in diminutive size, and in habits they resemble the genus *Calamaria*. It is solely the smallness of the mouth which renders the preceding species of *Elaps* harmless to man, as from the following it will be perceived, that their venom is as virulent as that of other venomous Serpents. From the diminutive size of the venomous glands, the quantity of fluid secreted is small: scarcely more than a drop from each. It is a pellucid, colourless fluid slightly reddening litmus paper.

After several unsuccessful attempts to make an adult *Elaps nigromaculatus* spontaneously bite a fowl, the jaws were forcibly closed over a protracted fold of the skin on the inner side of the left thigh of the bird. On account of the small gape, some difficulty was experienced in making the jaws close over the fold of the skin, and, as it appeared doubtful if the fangs had penetrated, the serpent was in a quarter of an hour compelled again to wound the fowl in the skin below the right eye. Twenty minutes after the first wound the fowl became purged, and manifested symptoms of pain in the left thigh, which was continually drawn up towards the body, although the wounds inflicted there, and below the eye, were, from the smallness of the fangs, barely visible. Twenty-eight minutes after the first wound the bird commenced drooping, occasionally attempting to raise itself, and in 10 minutes more soporism occurred, interrupted by spasms of the neck, flow of saliva, and pecking the earth with the beak, while the pupil was spasmodically contracted, and alternately dilated. The latter symptoms continued during thirty minutes, when death occurred in an hour after the first wound had been inflicted. Fowls wounded by *Elaps furcatus*, Var, and *Elaps bivirgatus* Var, expired under similar symptoms, from within an hour and twenty minutes, to upwards of three hours. The serpents which all had forcibly to be made to inflict the wounds, shortly afterwards expired, apparently from the violence to which they had been subjected.

(2389) Gen. BUNGARUS, Daudin.

Body elongated, slightly cylindrical; tail short; head oval, trunk and tail with a dorsal series of large hexagonal scales; the tail beneath

with scuta, in the middle sometimes with scutella; behind the fangs some simple maxillary teeth.

(2390) BUNGARUS FLAVICEPS, J. Reinhardt. Young.—Head and neck blood-red, with a pointed elongated black mark between the occipitals, and a short black dorsal line on the neck; the trunk black with steel-blue reflections, at the anterior part of each dorsal hexagonal scale a short longitudinal white streak; near the tail blood-red; each scale of the two lowest lateral series, white with a black spot, placed so as to produce a continued lateral, white zig-zag line; the posterior part of the sides blood-red. Lips and throat blood-red; abdomen black, posterior part as well as the tail blood-red, with a few black spots. Iris and tongue black.

Scuta abdominalia 209; Scuta subcaudalia 16; Scutella 38.

Habit.—Pinang. Java.

M. J. Reinhardt has described the adult from an unique specimen in the Royal Museum, Copenhagen. Spirits of wine change the brilliant blood-red to a pale yellow colour. The diagnosis must therefore be altered accordingly. The adult appears to differ from the young, in having none of the black marks of the head and tail, and no lateral white line.

A single young individual, found by Sir William Norris, on the Great Hill of Pinang, was of the following dimensions:

	Feet.	Inch.
Length of the head,....	0	0 $\frac{5}{8}$
Do do trunk,...	1	4 $\frac{2}{8}$
Do do tail,.....	0	3
	—	—
	1	8 $\frac{1}{8}$

Circumference of the neck 1, of the trunk 1  $\frac{2}{8}$ , of the root of the tail  $\frac{5}{8}$  inch.

The centre of the back forms a ridge, from whence the sides slope; the abdomen is broad, slightly arched, so that the vertical section of the body becomes broad triangular. The neck is covered by 15, the trunk by 13 longitudinal series of smooth, imbricate, rhomboidal scales. As observed by M. J. Reinhardt, the correspondence of colours, and their distribution, between this species and *Elaps bivirgatus* is very striking. Besides, the number of series of scales, is another character, approximating this species to the genus *Elaps*.

(2391) BUNGARUS CANDIDUS, (Linne.)

SYN.—Seba II, T, 66, Figs. 3 and 4.

Coluber candidus, Linne.

Russell I, Pl. 1. Paragoodoo.

Russell II, Pl. 31, Sew Walaley.

Pseudoboa coerulca, Schneider.

Boa lineata, Shaw,

Bungarus coeruleus, Daudin.

Bungarus semifasciatus, Kuhl.

Aspidoclonion semifasciatum, Wagler.

Bungarus semifasciatus, Schlegel.

## REPTILES OF THE

Above black with steel blue reflections, interrupted by numerous narrow transversal white bands, produced by the white edges of the scales. On each side the bands are bifurcated, and the two or three lowest series of scales, white with black spots. Lips and throat white; abdominal surface yellowish white. Iris black: tongue white.

Scuta 201 to 221; Scuta subcaudalia 38 to 56.

*Habit.*—*Malayan Peninsula*. Java, Tenasserim, Bengal, Assam, Coromandel, Ceylon, Malabar.

A single young individual, killed by Capt. Congalton near Keddah, was of the following dimensions:

	Feet.	Inch.
Length of the head,...	0	1
Do. do. trunk,...	2	3 $\frac{5}{8}$
Do. do. tail,....	0	4 $\frac{5}{8}$
	—	—
	2	9 $\frac{3}{8}$

Circumference of the neck 1  $\frac{1}{8}$ , of the trunk 2, of the root of the tail 1  $\frac{1}{8}$  inch.

Assam produces also a constant variety (*B. lividus*, Cantor) of a uniform blue black above; beneath yellowish white: in some the scuta blackish with white edges. In the very young the head is white with a black line between the occipital shields. It further differs in having the hexagonal scales smaller, less distinct from the rest, and the tail more robust than the normal individuals.

(2392) *BUNGARUS FASCIATUS*, (*Schneider*.)

*SYN.*—Scheuchzer, Pl. 655, Fig. 8.

Seba II, Pl. 58, Fig. 2.

Russell, I, Pl. 3, Bungarum Pamab.

*Pseudoboa fasciata*, Schneider.

*Boa fasciata*, Shaw.

*Bungarus annularis*, Daudin.

*Aspidoclonion*, Wagler.

*Bungarus annularis*, Schlegel.

Ground colour bright gamboge; the anterior half of the head, and the cheeks black with steel blue reflection; from the vertical shield a black longitudinal band, expanding over the neck and sides, and with the former forming a broad arrow mark; lips and throat gamboge, upper lips edged with black; the rest of the body completely surrounded by a number of broad, alternate gamboge and shining black, rings. Iris black; tongue flesh-coloured.

Scuta 200 to 234, scuta abdominalia 32 to 36.

*Habit.*—*Pinang, Malayan Peninsula*. Java, Tenasserim, Bengal, Coromandel.

The neck is covered by 17, the trunk by 15 longitudinal series of smooth scales, which with the exception of the dorsal hexagonal series, are imbricate, rhombic. As noted under *Elaps bivirgatus*, *Var*, the larynx is not attached to the scabbard of the tongue. Of three young individuals from the valley of Pinang and Province

Wellesley, the largest was of the following dimensions:

	Feet.	Inch.
Length of the head,....	0	1 $\frac{3}{8}$
Do. do. trunk,...	3	5
Do. do. tail,.....	0	4 $\frac{1}{8}$
	—	—
	3	10 $\frac{3}{8}$

Circumference of the neck 2, of the trunk 3  $\frac{3}{8}$ , of the root of the tail 2, of the apex 1  $\frac{3}{8}$  inch.

In the Malayan countries the species of *Bungarus* are not numerous, but *B. Candidus*, and *fasciatus* are of no uncommon occurrence in Bengal and on the Coromandel Coast, where, however, it should be observed, a class of the natives ("serpent-charmers,") earn a livelihood by capturing and exhibiting serpents, but this craft is unknown among the Malays.

The preceding three species, like the rest of the venomous serpents, are very ferocious when attacked, but unprovokedly they are not known to attack man: on the contrary, when met in the jungle, they attempt to escape. When trod upon, or struck, their rage is instantly excited, in self-defence they will even turn from their retreat, and then their habitual sluggishness is roused to furious activity. Preparing to attack, the head is, by a short curve of the neck, brought closely to the body, and drawn far backwards, when suddenly darting the anterior part of the body obliquely upwards, they bite. The height of the place where the wound is inflicted, of course depends on the length of the serpent, which is capable of darting nearly the anterior half of the body. Notwithstanding the circular pupil, they appear to shun the light, hiding the head under the folds of the body, and they are singularly uncertain in their movements, often suddenly jerking the head or tail without any apparent object. Like all serpents of tropical Asia, they seldom expose themselves to the sun: when during the day they leave their hiding places, they select the shade. The genus *Bungarus* is terrestrial, feeding on rats, mice, serpents, (*Col. mucosus*, Lin) and toads. Like other venomous serpents, when the venom has been inflicted on their prey, they disengage it from the fangs, sheathe and place them as horizontally as possible, in order that they may offer no resistance to the introduction into the mouth of the lifeless prey, which is now seized head foremost. The innocuous serpents bite or strangle their prey, which when life is extinct is either swallowed at once, or if it happens to have been killed in a position, likely to render the deglutition difficult, is often disengaged from between the teeth, and seized a second time, by the head. In captivity these serpents refuse food, but greedily lap up and swallow water.

A fowl four minutes after it had been bitten on the inner side of the thigh, by a *Bungarus*



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*fasciatus*, fell on the wounded side, and was shortly after seized with slight purging. The eyes were half closed, the pupils alternately dilated and contracted, immobile. In 17 minutes slight spasms occurred, under which the bird expired 43 minutes after it had been wounded.

\* Another few wounded in the same place as the former, by the same serpent, but after an interval of seven hours, expired under similar symptoms, only more violent spasms, in the course of 23 minutes.

Venom taken from another serpent, the fangs of which had been extracted, was inoculated by a lancet-incision in the right thigh; four minutes after the fowl was seized with trembling, fell, and remained lying on the wounded side, with the eyes closed, but it gradually recovered, and rose apparently recovered, 30 minutes after the inoculation of the venom.

Other fowls were killed by different serpents of this species, in 20 to 31 minutes.

Fowls bitten by *Bungarus candidus* expired under similar symptoms, within 30 to 45 minutes; dogs from within 1 hour 10 minutes, to 2 hours, under symptoms noted in Russell's experiments (Russell I, page 53.)

SUB-FAM. NAJINÆ, Bonaparte.

(2393) HAMADRYAS, Cantor.

Head broad, sub-ovate, depressed, with a pair of very large post-occipital shields, and a short, blunt muzzle; cheeks tumid; eyes large, prominent, pupil circular; nostrils wide, between two shields; behind the fangs a few maxillary teeth; neck dilatable; trunk thick, cylindrical; tail short, with Scuta and Scutella.

(2394) HAMADRYAS OPHIOPHAGUS, Cantor.

SYN.—Hamadryas hannah, Cantor.

*Naja elaps*, Schlegel, (Young.)

*Naja bungarus*, Schlegel, (Young)

*Naja vittata*, Elliot.

*Hamadryas ophiophagus*, apud. Elliot, b

Olive green above; the shields of the head, the scales of the neck, posterior part of the body, and of the tail edged with black; the trunk with a number of distant, oblique, alternate black and white bands, converging towards the head; the throat and anterior part of abdomen impure gamboge, the rest of the scuta and scutella bluish gray; marbled with black, or pale yellowish green, with a narrow submarginal brown line. Iris golden, spotted with black; tongue bluish black.

Scuta 215 to 256; Scuta sub-caudalia 13 to 32; Scutella sub-caudalia 63 to 96.

*Habit.*—Pinang, Singapore, Malayan Peninsula, Java, Sumatra, [Note. Sir Stamford Raffles' specimen in the Museum of the Zoological Society, London.] Bengal, Assam, [Specimen in the collection of H. Walker, Esq. Surgeon, G. G.] Coromandel.

Of two individuals, from the summit of the

Great Hill of Pinang, and from Province Wellesley, the larger was of the following dimensions:

	Feet.	Inch.
Length of the head,...	0	3
Do. do. trunk,...	8	1
Do. do. tail,....	2	4
	10	8

Circumference of the neck  $5\frac{2}{3}$  of the trunk  $8\frac{5}{8}$ , of the tail,  $4\frac{1}{8}$  inch.

The neck is covered by 21, the trunk by 17 longitudinal series of smooth imbricate scales; those of the two lowest series are large rhombic; of the sides irregular rhomboidal, appearing linear, all with rounded apex. The Malayan individuals are of a lighter colour, more inclining to yellow, than those observed in Bengal.

(2395) *Gen. NAJA*, Laurenti.

Head covered with shields; muzzle truncated; the anterior part of the trunk, between the 6th and 12th abdominal scutum, considerably dilatable in the shape of a disk, with a large, white, transparent spot above, edged with black, and somewhat resembling a pair of spectacles.

(2396) *NAJA LUTESCENS*. \* Laurenti, Var. (D. Daudin.)

SYN.—Seba II, T, 97, F, 4,

*Naja peruviana*, Lacepede.

Russell, I, Pl. 5, Fig. 4, Sankoo Nagoo.

Latreille IV. T. 27.

*Vikera naja*, Var D, Daudin.

*Aspis*, Wagler.

*Naja tripudians*, Var, Gray, Ill, Ind. Zool.

*Naja tripudians*, Merrem, Var, Schlegel.

"Ular mata-ari." of the Malays.

\* [Note.—*Coluber naja* Linne *Naja lutescens*, Laurenti, the *Cobra de Capello*, has probably the widest range of the Asiatic venomous serpents. The species, or its varieties, inhabits the countries between the Sutlej and Cape Comorin, and Ceylon. According to Mr. Hodgson's observations it does not occur in the valley of Nepal, but it ranges through Hindustan down to Cape Romania, the southern extremity of the Malaya Peninsula, and from thence to Chusan, 30° N. E. 122° E. It is also found in the Philippines, Ternate, Borneo, Java, Sumatra.]

Head shining dark brown above; on the sides and lips brownish white; ground colour of the trunk buff, the anterior half of each scale pale greyish brown; beneath buff. Iris black with a narrow light grey margin towards the orbit; tongue light flesh-coloured.

*Young.*—Much lighter brown than the adult and strongly iridescent.

Scuta 189 to 193; Scutella 49 to 54.

*Habit.*—Pinang, Singapore, Malayan Peninsula, Bengal, Coromandel.

It is numerous in the Malayan hills and valleys, but apparently of uncommon occurrence in Bengal.

# REPTILES OF THE

(2397) VAR. *NAJA NIGRA*.

*Syn.*—*Naja tripudians*, Var. *nigra*, Gray, Illustr. Ind. Zool.

*Naja tripudians*, Var. Schlegel.

Upper parts intense black with strong purple or blue reflections. temples, lips, and throat pale orange, largely spotted with black; the lateral part of the anterior eight or ten, and of the 14th, 15th and 17th scuta pale orange, black in the centre and with a broad black margin; the scales and interstitial skin on each side of the anterior eighteen or twenty scuta white or buff, appearing on the lower surface of the hood as two short parallel bands. The rest of the abdominal surface paler black than above, strongly iridescent, in certain lights pale silvery. Iris black with the lorbita margin pale gray; tongue light flesh coloured.

Scuta 184 to 187; Scutella 49 to 52.

*Habit.*—*Pinang, Singapore.*

At Pinang the preceding variety prevails, at Singapore the present. Both are local, and they appear respectively to congregate on single spots of limited extent.

Another black variety (*Naja atra*, Cantor) which inhabits Chusan, differs from the present in having a number of distant transversal double lines of a yellow colour. Beneath it is slate or pearl-coloured.

The food of *Naja lutescens* consists of rats, small birds, (it occasionally ascends trees,) lizards, and fishes, in search of which latter it frequently takes the water, and even the sea, along the coasts. The largest individual of the two Malayan varieties, was of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	1 $\frac{7}{8}$
Do. do. trunk,...	4	1
Do. do. tail,.....	0	9
	4	11 $\frac{7}{8}$

Circumference of the neck, 2 $\frac{7}{8}$ , of the trunk, 4 $\frac{3}{8}$ , of the root of the tail,  $\frac{3}{8}$  inch.

The following Memorandum relative to the venom of *Naja lutescens* (Laurenti) has kindly been communicated by J. M. Laidlay; Esq., Joint Secretary, Asiatic Society.

"The venom was carefully obtained so as to avoid any admixture of saliva, by compressing the venomous glands. It issued from the lower aperture of the fangs in viscid drops of a syrupy consistency, and was received as it fell from the fangs in platina capsules. The serpents operated upon were an adult *Cobra de Capello* (*Naja lutescens*, Laurenti) and one of its varieties (*Naja Kaouthia*, apud Belanger) and were supplied by the kindness of J. W. Grant Esq. C. S."

"In every instance the venom readily changed the blue of litmus to red, and restored the bright yellow to turmeric paper that had been reddened by the application of caustic alkali; an unequivocal

proof of acidity. When left to spontaneous evaporation, it dried into a varnish resembling mucilage, or the glare of an egg, cracking in all directions; and on being heated it deposited an abundant coagulum, apparently albuminous. In either instance when redissolved, it retained its acid property."

"What the nature of this acid may be, it was impossible to determine from the small quantity operated upon; nor am I prepared to say that the poison itself is an acid, although if it be not so, it is certainly associated with one. Most probably from the rapid and spontaneous disappearance of its properties by keeping, the poison itself consists of some exceedingly unstable compound, which would be wholly disorganised, under any attempt at solution by chemical means."

SUB-FAM. VIPERINÆ, Bonaparte.

(2398) Gen. TRIGONOCEPHALUS, Oppel.

Head broad triangular, scaly, with a pit before the eyes; trunk robust, cylindrical, tail short, tapering to a point, with scutella beneath.

(2399) TRIGONOCEPHALUS GRAMINEUS, (Shaw)

SYN.—Russell, I. Pl. 9, Bodroo Pam; II. Pl. 20. Coluber gramineus, Shaw.

Vipera viridis, Daudin.

Trimeresurus viridis, Lacepede.

Cophias viridis, Merrem.

Coluber gramineus, apud Raffles; Tr. Linn. Soc. XII.

Bodroo Pam. Russel, apud Davy: Ceylon &c. Bothrops, Wagler.

Trigonocephalus viridis, schlegel.

Trigonocephalus erythrurus, Cantor(young)

"Ular daun" of the Malays.

Grass green above, lighter on the sides, frequently interrupted by zig-zag lines, produced by the black interstitial skin; the tail in some bright cinnamon-red; from the sides of the neck along the lowest series of scales a pale yellow line. Lips, throat and abdominal surface greenish yellow; scutella in some spotted with cinnamon-colour. Iris golden, dotted with brown, but leaving a narrow margin bordering the elliptical black pupil, which is vertically contracted by the light. Tongue pale bluish with black apex.

Scuta 165 to 170; Scutella 58 to 71.

*Habit.*—*Pinang, Singapore, Malayan Peninsula.* New-Holland, [Note. Lacépède, on the authority of M. Baudin.] Timor, Pulo Samao, Celebes, Eastern Java, Banka, Sumatra, Tenasserim, Bengal, Chirra Punji, Nipal, [Note. Specimen in Mr. Hodgson's collection.] Coromandel, Ceylon.

VAR.

(2400) *Coluber graminens*, Var. apud Raffles, l.c.

Differs from the preceding by its Indian or brick-red line on each side.

*Habit.*—*Pinang, Singapore, Malayan Peninsula.* Sumatra, Tenasserim.



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In the *Malayan* hills and valleys the variety is by far the more numerous : it is indeed the most common of the venomous serpents. In Bengal I never observed but a single one, (*T. erythrus*), captured in the Sunderbuns. It is generally observed on trees, hanging down from the branches, or concealed under the dense foliage ; it preys on small birds and tree-frogs [*Polydectes leucomystax*, (Gravenhorst.)] But occasionally it descends to the ground, in search of frogs and toads. The neck is covered by 27 ; the trunk by 23 or 25 ovate imbricate, keeled scales. The tail is prehensile.

Of a number examined none exceeded the following dimensions :

	Feet.	Inch.
Length of the head,...	0	$1\frac{4}{8}$
Do. do. trunk,...	2	0
Do. do. tail,....	0	$5\frac{6}{8}$
	—	—
	2	$7\frac{2}{8}$

Circumference of the neck  $1\frac{4}{8}$ , of the trunk  $2\frac{2}{8}$ , of the root of the tail 1 inch.

(2401) *TRIGONOCEPHALUS SUMATRANUS*, (Raffles)\* *Var.* (See pl. XL, Fig. 9).

*Syn.*—"Ular kapak" of the Malays of the Peninsula.

\* [*Syn.*—Seba, II. T. 68, F. 4.—*Coluber sumatranus*, Raffles, Ular Poochook.—*Cophias Wagleri*, H. Boie.—*Tropidolaemus*, Wagler.—*Trigonocephalus wagleri*, Schlegel.]

*Habit.*—Sumatra.

*Young.*—Grass green above lighter on the sides and lips ; from the pit beneath the eye, over the cheek a cinnamon red line with the upper margin buff ; on each side of the back a series of distant spots, half cinnamon, half buff coloured, each of the two or three scales composing the spots, being of these two colours ; on the tail the spots are confluent, forming transversal lines. Beneath light yellowish green. The largest individual in this garb measured 1 ft.  $3\frac{2}{8}$  inch. in length.

*Adult.*—Ground colour above light yellow, or pale greenish yellow, largely mixed with intense dull black, so as to make the general appearance black, through which the ground colour appears on the head as irregular spots, and a continued line, beneath which a black line proceeds from the eye to the occiput : on the trunk and tail a narrow, distant, transversal band, continued or broken up into spots. Labials, gulars, the lowest two or three lateral series of scales, and scuta gamboge with black margins ; scutella largely spotted with black. Iris golden dotted with black and with a black transversal bar, pupil elliptical, vertically contracted by the light ; tongue bluish grey.

Scuta 141 to 147 ; scutella 42 to 52.

*Habit.*—Pinang, Singapore, Malayan Peninsula.

Unfortunately in the Malayan countries this variety is not of so rare occurrence as the species appears to be in Sumatra. Both are equally dreaded. The natives of Sumatra denominate it "Puchuk," a young, green shoot of a tree, a name expressive both of its colour and arborial habits. The Malays of the Peninsula, who only know the black variety, call it from its broad cordate head the "hatchet shaped" serpent, "Kapak," or "Kaph" signifying an axe. At Pinang it generally occupies the lower parts of the hills or the valleys, either on the ground or on trees, but Dr. Montgomerie in one instance observed it at an elevation of 2,200 feet. It preys upon rats, small birds, tree-frogs and toads. The neck is covered by 27, the trunk by 23 to 25 longitudinal series of ovate, imbricate keeled scales. The labials, and the gular scales are sharply keeled, but the keels of the former become obliterated with age. The tail is prehensile. Of nine examined the largest individual was of the following dimensions :

	Feet.	Inch.
Length of the head,.....	0	2
Do. do. trunk,...	1	$6\frac{4}{8}$
Do. do. tail, .....	0	$6\frac{1}{8}$
	—	—
	2	$2\frac{5}{8}$

Circumference of the neck  $2\frac{6}{8}$ , of the trunk  $4\frac{4}{8}$ , of the root of the tail  $1\frac{6}{8}$  inch.

(2402) *TRIGONOCEPHALUS PUNICEUS*, Reinwardt.

*Syn.* Seba. II. Tab. 64 Fig. I.

Klein : Tentam, Pg. 10. No 25. \*

*Vipera acontia* Laurenti.

*Coluber acontia*, Gmelin.

*Vipera acontias*, Daudin.

*Echidna acontia*, Merrem.

*Trigonocephalus puniceus*, Reinwardt.

*Atropos*, Wagler,

*Trigonocephalus purpureo-maculatus*, Gray, Ill.

Ind zool.

*Trigonocephalus puniceus*, Schlegel,

\* [As several serpents have by Klein been indicated under the name of *acontias*, the specific name of Reinwardt has been substituted.]

Dull reddish-brown or olive tinged with purple ; in some an indistinct black line from the eye to the sides of the neck ; the scales dotted or finely marbled with black, their keels pale ochre ; the posterior part of the trunk and tail with irregular dark brown spots ; the interstitial skin reddish brown, lighter or darker than the scales ; lips, throat, the three or four lowest series of scales, and beneath pale greenish yellow ; scuta and scutella with brown margins, the latter largely spotted with brown. Iris greenish golden marbled with black ; pupil elliptical vertically contracted by the light ; tongue light brownish grey.

Scuta 162 to 171 ; Scutella 65 to 70.

## REPTILES OF THE

*Habit.*—*Pinang, Malayan Peninsula.* Singapore, Java.

The Malayan individuals differ slightly from the Javanese in having very few dark spots and no reddish line above the black one on the sides of the head. The oval gular scales have a tubercular appearance. The integuments of the head and body are remarkably lax, like those of *Acrochordus javanicus*. The neck is covered by 31, the trunk by 27 longitudinal series of ovate or conical scales; they are not imbricate, but are frequently surrounded by the naked skin. The tail is prehensile, but less so than in the preceding species. The Malayan individuals appear to be less numerous than the Javanese.

The four observed were all found on the ground in valleys. The largest, which had been feeding on a rat was of the following dimensions;

	Feet:	Inch.
Length of the head, ..	0	1 $\frac{4}{8}$
Do. do. trunk, ..	2	5 $\frac{3}{8}$
Do. do. tail, .....	0	5 $\frac{4}{8}$
	3	0 $\frac{3}{8}$

Circumference of the neck 2, of the trunk 3  $\frac{4}{8}$ , of the root of the tail 1  $\frac{3}{8}$  inch.

In general sluggish, but when roused, ferocious habits, the preceding three species resemble the genus *Bungarus*; their mode of attack is also similar: like *Vipera Russellii*, (Shaw), [Note. SYN.—Russell, I. Pl. 7. *Katuka Rekula Poda*, II. Pl. 32.—*Coluber russellii*, Shaw.—*Vipera elegans*, Daudin.] when it prepares to dart, they vibrate the prehensile tail, and utter a faint hissing sound. As the pupil is vertically contracted by the light, they frequently miss their aim, and like *Bungarus*, *Naja*, *Vipera Russellii* and *Hydrus*, in the extreme of fury, they will fix the fangs in their own bodies. Although they are averse to motion, they are not of quite so stationary habits as represented by M. Schlegel, (*Essay: Partie Descriptive*, page 520.) In the jungle I have noticed them moving between the branches of trees or on the ground, either in search of prey, or after heavy rains have flooded their hiding places. In Bengal most terrestrial serpents keep the latter during the hot season, but the rains send them abroad in search of dry localities. Although the present genus has venomous organs, as highly developed as *Crotalus* or *Vipera*, the effects produced by wounds of two species at least, appear to be less dangerous, than might *a priori* be supposed. According to Russell's experiments with the venom of *Trionocephalus gramineus*, chickens expired within 8 to 33 minutes, pigeons in 14 to 18 minutes. A pig recovered in 6 or 7 hours, a dog in 2 to 3 hours, after having been wounded, (Russell, I. page 60.) Mr. Hodgson has seen a man who was wounded by this

species, the only venomous known to inhabit Nepal, fearfully suffering from pain and swelling, but he never heard of a fatal case.—*Transactions Zoological Society*. London. Vol. II, page 309.

A male *Trionocephalus puniceus*, successively wounded two fowls, one in the chest, the other in the left thigh. In both cases the fangs of both sides acted, but neither of the birds experienced any other effect except a slight pain, which lasted a few minutes after they had been wounded. It should, however, be observed, that the serpent at the time had gorged itself with food, in which state it was observed close to the General Hospital, in the valley of Pinang. Another individual was subsequently caused to wound a fowl on the inside of the thigh. The bird immediately drew up the wound leg, fell down and was purged 3 minutes after being wounded. In 3 minutes more, slight spasms of the head and neck appeared at short intervals, but they ceased in 5 minutes, when the fowl made, at first some unsuccessful, attempts to rise. Twenty-one minutes after having been wounded, the bird rose, shook the wings, and had perfectly recovered. The same serpent subsequently was made to wound another fowl on the inside of the left thigh. The bird drew up the wounded leg, and was slightly purged, but showed no other inconvenience from the wound.

The following experiment is communicated by Dr. Montgomerie. An adult *Trionocephalus sumatranus*, Var. was made to bite a fowl in the fleshy part of the thigh. The bird limped about for a short time, and a minute after it was wounded commenced purging. At the end of two minutes it fell, breathing laboriously and was strongly convulsed. At the end of six minutes a few drops of water exuded from the eyes; in fifteen seconds more it was quite dead: six minutes and a quarter after it had been wounded. Both fangs had acted, the wound was livid, and similar lines were observed in the course of the absorbents. On another occasion, after some unsuccessful attempts to make another individual bite a fowl, a terrier accidentally was wounded in the fleshy part of the fore-arm. The serpent fixed the fangs for an instant in the flesh; the dog pitifully screaming, jumped and shook it off. A ligature was immediately applied above the elbow, and the dog secured in a cage. It continued for some time whining from pain, probably aggravated by the tight ligature, which was removed at the close of half an hour, and the dog let free. In a short time it had regained the free use of the limb and was apparently well. But on the third day following a perfectly circular slough, including the bitten spot of about  $\frac{3}{4}$  of an inch in diameter, was thrown off, the sore readily healed up and the dog suffered no further inconvenience.



## MALAYAN PENINSULA AND ISLANDS.

## PELAGIC.

FAM. HYDRIDÆ, *Bonaparte*.(2403) *Gen. LATICAUDA*, Laurenti.

Tail compressed, with two surfaces, gradually increasing in height, and with three furrows (sutures) on each side.

(2404) *LATICAUDA SCUTATA*, Laurenti.

SYN.—*Coluber laticaudatus*, Linne. Mus. A. Fig. 1754.

*Laticauda imbricata*, Laurenti? 1768.

*Le serpent large queue*, Daubenton, 1748.

*Coluber laticaudatus*, apud Thunberg, 1787.

*Coluber laticaudatus*, apud Gmelin, and E. W. Gray, 1789.

*La queue plate*, Lacepede, 1801.

*Hydrus colubrinus*, Schneider, 1801.

*Platurus fasciatus*, Latreille, 1802.

*Hydrus colubrinus*, apud Shaw, 1802.

*Platurus fasciatus*, Daudin, 1803.

*Aipysurus lævis*, Lacepede, 1804, (Var?)

*Platurus semifasciatus*, Reinwardt, M. S.

*Platurus fasciatus*, apud Wagler, 1830.

*Hydrophis colubrina*, Temminck and Schlegel, Fauna Japonica, Tab. 10.

*Hydrophis colubrina*, Schlegel, 1837.

*New born*.—Ground colour gamboge, greenish above, with numerous distant broad rings of a blue reflecting black colour, encircling the body; the first and second black mark of the head and neck are beneath joined by a short longitudinal line, commencing on the lower labial shields; another shorter black line borders above the gamboge upper labials; the scales between the rings, the scuta and scutella with blackish margins.

*Older*.—Of paler colours, lead-grey on the back; the rings impure light blue on the sides and abdomen. The scales and scuta without blackish margins. Iris black, pupil circular; tongue grey.

Scuta 227 to 246; scutella 32 to 41.

*Habit*.—Sea of the Malayan Peninsula and Islands.

Bay of Bengal (Ramree, Pondicherry, Nicobars), Sea of Timor, Molucca and Liewkiew Islands, Celebes, New Guinea, Tongataboo, China Sea.

This species is readily identified by the abdominal scuta, and the scutellated very broad tail. The anterior frontals are separated by a small elongated pentagonal, or rhombic, shield, bordered behind by the vertical, which is proportionally the largest shield, either equaling or exceeding each of the occipitals. The eyes are comparatively large and prominent, surrounded by two post-orbitals, one præ-orbital, and beneath, by the third and fourth of the seven large upper labials. The lower jaw is covered in front by the restral and the two first labials, the succeeding seven are elongated linear and placed horizontally so as to be hid by

the upper labials, when the mouth is closed. The chin is covered by two pairs of pentagonal shields, between which and the labials appear two or three series of elongated scales. The neck is covered by 25, the anterior part of the trunk by 23, increasing to 25 and again decreasing to 19 longitudinal series of large, smooth scales. The nostrils are small, opening laterally. The tail, though much compressed, presents a broad flat surface beneath, till near the apex, where it becomes two-edged. The largest individual examined was of the following dimensions:

	Feet.	Inch.
Length of the head....	0	1
Do. do. trunk....	3	2
Do. do. tail.....	0	5 $\frac{3}{8}$
	3	8 $\frac{3}{8}$

Circumference of the neck,  $1\frac{7}{8}$ : greatest do. of trunk, 4 inch.

(2405) *Gen. HYDRUS*, Schneider.

Body slender in front, gradually thickening, covered with scales; tail compressed, two-edged.

(2406) *HYDRUS STRIATUS*, (Lacepede.)

SYN.—*Leioselasma striata*, Lacepede, 1804,

*Hydrophis striata*, Temminck and Schlegel: Fauna Japon. Pl. 7.

*Hydrophis Striata*, Schlegel: Essay, 1837.

*Hydrophis striata*, Schlegel, apud Cantor, Tr. Zool. Soc. London, Vol. 11.

[Note. DOUBTFUL SYNONYMY.—*Russell II Pl.*, 9, *Chittul*, 1801, agrees with this species in the following characters: the eyes high, small, orbicular; the trunk round till near the anus, where it becomes compressed; the scales smooth, imbricate, orbicular on the sides; the central abdominal series much larger than in any of the other species, (Russell.) The difference of colours is unimportant as it is liable to variations, not only individually but according to age. Besides, all the species acquire a light bluish appearance about the period when the integuments are to be changed. Russell's description was copied by Daudin, who merely supplied the denomination of *Hydrophis cyanocinctus*, (*Hydrus brugmansii*, Boie, 1827,) upon which Wagler founded his genus *Enhydria*, 1830. According to M. Schlegel, all these are synonymes of *Hydrus nigrocinctus* (Daudin). The only means of deciding the synonymy of this and most of the other species appears to be a close examination of such original specimens, described by Russell and Shaw, which may at present exist in the collection of the British Museum.]

*Adult*!—Crown shields light chestnut; lips and throat pale yellow; ground colour above pale greenish yellow, sides and abdomen buff with numerous distant black transversal bands, becoming indistinct towards the tail and on the sides, where the scales are partially edged or spot-

# REPTILES OF THE

ted with black. The interstitial skin of the back and sides black, of the abdomen buff. Iris dark grey with a buff orbital margin; pupil black minute; tongue buff.

Central abdominal series of larger scales,  $347 + 41$ .

*Habit.*—*Sea of Pinang and Malayan Peninsula.* Sea of Liewkiew Islands, Timor, Sumatra, Bay of Bengal.

The eyes are lateral, sunk, excessively small, of a diameter equally the large almost vertically opening nostrils. The single præ-orbital shield is beneath wedged in between the second and third upper labial. The latter, as well as the fourth and fifth, border the orbit beneath. Of the two post-orbitals the lower is wedged in between the fifth upper labial and the large shield resting upon the sixth upper labial. Above the latter and the seventh, the cheeks are covered by three very large shields. The seven upper labials are large and very high. Of the nine inferior labials the two anterior are the largest, and placed vertically, the succeeding seven are smaller and placed nearly horizontally, so as to become partially hid when the jaws are closed. The chin is covered by the first pair of labials and two pairs of elongated mentals, between which and the inferior labials intervene on each side the second labial, three very large shields, and three smaller. The neck is covered by 37, the anterior part of the trunk by 33, and the thickest by 40 longitudinal series of rhombic scales. In the individuals examined by M. Schlegel, all of less length than my own, the series varied from 31, 29 to 27. The scales are rhombic with rounded apex, each scale with a small central tubercle, or an elevated (keeled) line, which however with age becomes indistinct or obliterated. The central larger abdominal scales are hexagonal, with or without a small tubercle on each side. The anus is covered by three or four excessively large scales. The larger individual of two was of the following dimensions:

	Feet.	Inch.
Length of the head,...	0	$1\frac{5}{8}$
Do. do. trunk,...	5	$6\frac{3}{8}$
Do. do. tail,....	0	$4\frac{6}{8}$
	6	$0\frac{6}{8}$

Circumference of the neck,  $3\frac{3}{8}$ , greatest do. of the trunk,  $4\frac{2}{8}$  inch.

(2407) *HYDRUS NIGROCINCTUS* (Daudin)

*SYN.*—Russell, II Pl. 6. Kerril Pattee, 1801.

[*Doubtful Syn.*—Russell, II. Pl. 13. Kud-dell Nagam, 1801 (*Enhydris gracilis*, Merrem, 1820.) *Hydrus spiralis*, Shaw, 1802]

*Hydrophis nigrocinctus*, Daudin, 1803.

*Hydrophis melanurus*, Wagler, 1828.

*Polydotes annulatus*, Lesson, 1833

*Hydrophis nigrocincta*, Schlegel, 1837.

*Hydrophis nigrocincta*, Schlegel, apud Cantor,

l. c.

*New born.*—Ground colour buff or bluish-white; upper lips and muzzle black, and a transversal band across the hind head, from whence proceeds a triangular or cross mark towards the vertex; gular and inferior labia shields edged and spotted with black; trunk and tail with numerous black transversal bands, either encircling the body, or interrupted on the abdominal ridge, where appear a few indistinct black spots; apex of the tail black. Entire length  $8\frac{1}{8}$  inch.

*Older.*—Greyish green olive above, yellowish on the sides, buff beneath; the bands less intense black, often placed obliquely so as to join each other on the back. Iris grey; pupil circular, black; tongue buff. Central abdominal series of larger scales,  $281 + 41$ ;  $284 + 43$ ;  $289 + 39$ .

*Habit.*—*Sea of Malayan Peninsula, Pinang, Singapore.* Estuaries of the Ganges, Bay of Bengal.

This species greatly resembles *H. striatus* from which it differs in the more compressed general form; the eye though small, is of a larger diameter than the nostril, and it is surrounded by a single post-orbital shield, which beneath is wedged in between the fourth and fifth upper labial, and the præ-orbital between the second and third. The orbit is bordered beneath almost entirely by the fourth upper labial. The sixth upper labial is the largest, in some individuals covering the cheek and bordering above the occipital. Of the seven or eight inferior labials the four anterior are very large, above the third there is one or two small triangular shields; the other three or four posterior labials are very small elongated. There is no horizontal series of labials as in *H. striatus*, and the two elongated pairs of mentals immediately border the labials. The neck is covered by 33, the thickest part of the trunk by 53 longitudinal series of scales. Those examined by M. Schlegel, the length of which exceeds those come under my own observation, had 27, 29 to 31 series of scales. Those of the anterior part of the back are rhomboidal, those of the posterior part rhombic with rounded apex and slightly imbricate; those of the sides hexagonal: all have either a sharply raised keel or a central tubercle, both of which frequently become obliterated. The central series of abdominal scales are a little larger than the rest, frequently divided in two hexagonal, and with a small tubercle on each side, which often becomes indistinct, or obliterated. The anus is covered by 3 or 4 very large, or by a series of small scales.

The largest of six individuals was of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	$0\frac{6}{8}$
Do. do. trunk,....	2	$0\frac{2}{8}$
Do. do. tail,.....	0	$2\frac{6}{8}$
	2	$3\frac{6}{8}$



# MALAYAN PENINSULA AND ISLANDS.

Circumference of the neck,  $\frac{2}{3}$ ; greatest do. of the trunk, 2 inch.

VAR.? (See Pl. XL. Fig. 8.)

Crown shields olive green with a blackish band from the eyes over the anterior part of the upper lip; the posterior part and the lower lip pale yellow; ground colour of the trunk greenish lead grey above, pale yellow on the sides, beneath buff, with numerous black transversal bands. Iris amber-coloured with the orbital margin dark grey. Central abdominal series of scales  $235 \times 38$ .

It differs from the preceding in the following particulars. The head is proportionally shorter, broader triangular, the muzzle more pointed, and the upper surface from the vertical shield very declivous. The eyes are much larger than the nostrils, with a single præ and post orbital, but bordered beneath by the third and fourth upper labial. The latter, six in number, present nothing abnormal. The lower labials are also six, proportionally larger than in the preceding. The mouth is smaller. The make of the trunk is more robust; the neck is covered by 15, the thickest part of the body by 21 longitudinal series of proportionally much broader hexagonal series, tuberculated on the anterior part of the trunk, on the rest keeled, forming series of sharp, continued ridges. The central abdominal series is at first somewhat larger than the rest, angular, with a small more or less distinct tubercle on each side. A single individual, captured in a fishing stake off Pinang, was of the following dimensions:—

	Ft.	Inch.
Length of the head,.....	0	$0\frac{5}{8}$
Do. do. trunk,.....	1	$6\frac{3}{8}$
Do. do. tail,.....	0	$2\frac{4}{8}$
	1 ft.	$9\frac{4}{8}$

Circumference of the neck,  $1\frac{1}{8}$ ; greatest do. of the trunk  $2\frac{1}{8}$  inch.

(2408) *HYDRUS GRACILIS*, Shaw.

SYN.—Russell, 1, pl. 44, Tatta Pam, 1796, (very young.)

[DOUBTFUL SYN.—*Anguis laticauda*, Linne, *Mus. A. F.* 1754. *Vomer. Monogr. Fig. 2*, 1774, *Hydrus fasciatus*, Schneider, 1801.]

*Hydrus fasciatus*, apud Shaw (Russell, 1. 44, excluding the other Syn) 1802.

*Anguis mamillaris*, Daudin, 1803.

*Hydrus*, apud Wagler, 1830.

Russell, II, pl. 7, Shooter Sun, 1801.

*Hydrus cloris*, Daudin, 1803.

*Hydrophis*, apud Wagler, 1830.

Russell, II, Pl. 8, Kalla Shootur Sun. 1801.

*Hydrophis obscurus*, Daudin, 1803.

*Hydrophis*, apud Wagler, 1830,

*Hydrus fasciatus*, apud Guerin: *Iconog Rept.* Pl. 25, I, 1829.

*Pelamis chloris*, Merrem apud Horsfield: *Life of Raffles*, 1830.

*Microcephalus gracilis*, Lesson, 1833,

*Hydrophis gracilis*, Schlegel (Syn, *Anguis xip-*

*hura*, Hermann, *Typhlops*, Merr, Tent, p. 158,) 1837

*Hydrophis gracilis*, Schlegel, apud Cantor, 1. c, Pl 56. (Young).

*New born*.—Head shining intense black; ground colour of the trunk and tail bright gamboge, on the back and sides interrupted by numerous black rings, which above are widened into lozenge shape, narrowed on the sides. Throat and anterior half of abdomen intense black, continued as a more or less distinct line to the black apex of the tail. On the sides the yellow ground colour appears in the shape of oval spots, gradually increasing in depth towards the tail. Entire length, 1 ft. 3 inch.

*Adult*?—Head and back uniformly dark olive or brown, becoming greyish on the posterior half, and very indistinct or obliterated on the sides. In some a pale yellow spot on each side of the hind head, and a third on the frontal shields. The lateral oval spots pale sulphur coloured on the anterior half, pale greenish yellow on the posterior. The black of the lower surface very pale, but distinct. Iris black; tongue buff. Central abdominal series of larger scales,  $454 \times 60$ .

*Habit*.—*Sea of Malayan Peninsula and Islands.* Bay of Bengal, Malabar, Sumatra, Borneo.

In form and number the shields of the head resemble those of *Hydrus nigrocinctus*, so as to afford no distinguishing character. Yet it may be readily distinguished from that and other species by the excessive slenderness of the anterior, cylindrical part of the trunk, which from thence becomes much compressed, gradually increasing in bulk and vertical diameter till towards the tail, where the diameter again decreases. The scales of the cylindrical, anterior part of the trunk are rhomboidal with rounded points and slightly imbricate; the rest are hexagonal. The central abdominal series continued beneath the tail, consists of hexagonal scales, a little larger than the rest, and frequently longitudinally divided. In the very young all the scales are smooth, with age the central abdominal ones acquire a small tubercle on each side, and those of the compressed sides and of the back each a central tubercle. In the largest individuals the central abdominal scales have three longitudinally placed minute tubercles on each side, and the rest of the hexagonal scales three or four similar central tubercles. In the new-born the neck is covered by 32, the bulkiest part of the body by 49 longitudinal series; these parts are covered by 26 and 44 series in the largest individual, which is of the following dimensions:

	Feet.	Inch.
Length of the head,.....	0	$0\frac{5}{8}$
Do. do. trunk,...	3	$2\frac{5}{8}$
Do. do. tail,.....	0	0
	3	$7\frac{4}{8}$

## REPTILES OF THE

Circumference of the neck,  $1\frac{2}{3}$ ; greatest do. of the trunk,  $3\frac{2}{3}$  inch.

(2409) *HYDRUS SCHISTOSUS*, (Daudin)

SYN.—Russell, II, pl. 10, Hoogli Pattee, 1801.

[DOUBTFUL SYN.—*Hydrus Major*, Shaw, 1802.—

*Disteira doliata*, Lacepede, 1804.]

Russell, II, Pl. 11, Valakadyen, 1801.

*Hydrophis schistosus*, Daudin, 1803.

*Hydrus valakadyen*, H. Boie, 1827.

*Disteira russelli*, Fitzinger, 1827.

*Hydrophis*, apud Wagler, 1830.

*Leioselasma schistosa*, Fitzinger, 1827.

*Hydrus*, apud Wagler, 1830

*Hydrophis schistosa*, Schlegel, 1837.

*Hydrophis schistosa* Schlegel, apud Cantor, l. c.

*New-born*.—Head above blackish, or dark brown; back and sides with numerous transversal blackish bands, broad above, narrow on the sides; lips, throat sides and abdomen buff; tail blackish with a few transversal buff bands above. Entire length  $10\frac{2}{3}$  inch.

*Adult?*—Head and back either uniformly pale greenish grey, or with darker transversal bands, becoming more or less indistinct on the sides; lips, throat, sides brownish white or buff; tail uniformly blackish, or greyish olive green. Iris pale amber or greenish-yellow, with a grey orbital margin; pupil black, tongue buff.

Central abdominal series:  $239 + 47$ ;  $242 + 42$ ;  $312 + 58$ .

*Habit*.—Sea of Malayan Peninsula and Islands. Bay of Bengal, Malabar, Sumatra.

The head is elongated conical, the muzzle sloping and the rostral shield beneath terminating in a vertically projecting point, which fits into a corresponding cavity in the lower jaw. The anterior elongated triangular frontal shields are next to the occipitals the largest; the large oval nostrils send a slit towards the external margin of the shields. The eyes are lateral, moderate, surrounded by a præ-orbital, a postorbital, frequently cut in two smaller, and beneath by the fourth upper labial shield. Behind the latter, the lip is covered by three or four horizontally placed small shields, above which appear three large vertically placed shields, of which the last borders the sides of the occipital pair. The lower rostral is remarkably elongated, linear, and hid in a furrow between the first pair of inferior labials. Of the latter the anterior five on each side are much elongated, followed by five or six smaller. The chin is covered with numerous minute scales, and like the rest of the body with very lax skin. In the young ones the neck is covered by 47, the bulkiest part of the body by 57 longitudinal series of smooth, somewhat tubercular scales. Older individuals have these parts covered by 48 and 60 series of hexagonal scales, either with a short keel dividing the anterior half, or a central tu-

bercle. The central, slightly raised, abdominal series commences very far back, from one to three inches behind the chin. The anterior scales are wedge-shaped hexagonal, the posterior are broader, but slightly larger, than the rest, with a small elongated tubercle on each side. The largest individual of a great number, was of the following dimensions:

	Feet.	Inch.
Length of the head,....	0	1
Do. do. trunk,...	3	$1\frac{2}{3}$
Do. do. tail,.....	0	$4\frac{2}{3}$
	3	7

Circumference of the neck,  $2\frac{2}{3}$ ; greatest do. of the trunk, 5 inch.

(2410) *HYDRUS PELAMIDOIDES*, (Schlegel.)

SYN.—*Pelamis carinata*, Cuvier, M. S.

*Hydrophis* (*Disteira doliata*, Lacep) Wagler, 1830.

*Lapemis hardwickii*, Gray, Ill. Ind. Zool. 1832.

*Hydrophis pelamidoides*, Schlegel, 1837.

*Hydrophis pelamidoides*, Temminck and Schlegel, Fauna Japon, Tab. 9.

*Hydrophis pelamidoides*. Schlegel, apud Cantor, l. c.

[DOUBTFUL SYN.—Russell, II. Pl. 12, *Shiddil*. 1801.—*Hydrus curtus*, Shaw. 1802.]

*Young*.—Sulphur coloured, paler on the sides and abdomen; the head largely spotted with blackish, through which the ground colour appears in the form of a rectangle, the two sides of which pass from the hind-head to the orbit, the anterior across the frontals, the posterior over the hind-head; two yellow spots between the nostrils, lips yellow, cheeks and throat blackish; on the back a number of transversal blackish bands to the middle of the sides, broader than the intervening yellow lines; tail black. Entire length  $10\frac{1}{2}$  inch.

*Adult?*—Head uniformly reddish brown above; ground colour greenish yellow, lighter on the sides and beneath, with broad lozenge shaped transversal bands of blackish olive, continued on the anterior half of the tail; posterior half blackish. Iris dark olive; pupil black, tongue buff.

*Habit*.—Sea of Malayan Peninsula and Islands. Bay of Bengal, Sea of Celebes, Molucca Islands, China Sea.

The head is much depressed, not broader than the neck; the muzzle broad, rounded; the rostral shield is large, rectangular pentagonal, broader than high, the lower margin with a central point and a notch on each side. The eyes are moderate, lateral, not prominent, surrounded by a præ-orbital, a post-orbital, and beneath by the third and fourth upper labials. The frenal shield, observed by M. Schlegel, was not present in four individuals, examined in the Straits of Malacca; its existence therefore appears not to be constant;



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in all *Hydri* the shields of the head are liable to considerable individual variations of form. Of the eight upper labials the posterior three are very small, which is also the case with the posterior five of the nine inferior labials. The two pairs of elongated mentals are outside bordered by the three first inferior labials, inside, by several small scales. In the young the neck is covered by 37, the thickest part of the trunk by 40 longitudinal series of hexagonal, smooth, comparatively small scales. In the older individual these parts are covered by 32, and 37, large hexagonal scales, each with a central tubercle. The lower series of the sides are slightly larger than the rest, and vertically elongated, so as to acquire a rectangular appearance. The central abdominal series is much smaller than the rest. Each scale is either rhombic, and, as represented in the excellent plates of *Fauna Japonica*, hemmed in between four [Note. A somewhat similar disposition is observed in the central dorsal series of the however differently shaped scales of *Xenodermus javanicus*, Rienhardt.] of the two lowest lateral series or they are absent, and their place is occupied by a pair of the former, which are soldered together. In young individuals the central series frequently consists of alternate broad triangular, and very minute rectangular scales; both kinds smaller than the rest. The largest individual of four was of the following dimensions:

	Ft.	Inch.
Length of the head,.....	0	1
Do do trunk,.....	1	8
Do do tail,.....	0	2½

1 ft. 11½ in.

Circumference of the neck, 2½; greatest do. of the trunk, 4 inch.

(2411) *HYDRUS BICOLOR*, Schneider.

Syn.—Seba, II, Tab. 77. Fig 1.

Angvis platyura. \* Linne. 1766.

\* In consequence of the specific name of Linne having been applied by Latreille to a genus (*Platyrus*), that of Schneider, the next different in succession, has been substituted.

Vosmaer: Monogr, Fig. 1. 1774.

Angvis platyuros, apud Gmelin, 1788.

Russell, 1. Pl. 41. Nalla Wahlagillee Pam, 1799.

Lacepede V. Tab. 15, Fig. 2. 1801.

*Hydrus bicolor*, Schneider, 1801.

*Hydrophis platyrus*, Latreille, 1802.

*Hydrus bicolor*, apud Shaw, 1802.

*Pelamis bicolor*, Daudin 1803.

*Pelamys* (*Angvis platyura*, Lin) Wagler 1830.

*Pelamis bicolor*, apud Horsfield, Life of Raf. fies, 1830.

*Pelamis bicolor*, apud Oken, 1836.

*Hydrophis pelamis*, Schlegel, 1837.

*Hydrophis pelamis*, Temminck and Schlegel, *Fauna Japonica*, page 60.

Head and back black (inky), forming a straight line on the sides till towards the posterior part, where it becomes largely undulating, so as

to appear as broad band; lips, throat and sides sulphur coloured, turning into yellowish white or buff on the abdomen [Note. In the individual figured by Russell, the bright yellow colour formed a narrow lateral line, below which the sides and abdomen were of a dusky greenish yellow.] and tail; posterior parts of the sides with some more or less distinct rounded black spots; tail largely banded or spotted with black. Iris pale yellow with a broad black orbital margin; pupil black; tongue buff.

*Habit.*—Sea of Malayan Peninsula. Bay of Bengal, Malabar, Sea of Sumatra, Java, Celebes, Molucca Islands, China Sea (to 27° N. Lat.) Otaheite, Bay of Port Jackson (33° 55' S. Lat.—151° 25' E. Long.)

The head is very elongated, depressed, viewed from above, it presents a striking resemblance to *Herpetodryas oxycephalus* (Reinwardt). The eye is larger than in any other species of *Hydrus*, surrounded by two, three, or even four post-orbitals, one large præ-orbital, and beneath, by the fourth upper labial shield. A frenal shield has been observed in some individuals, but it was absent in that examined in the Straits of Malacca, nor does it exist in the specimens, in the Museum of the Asiatic Society. The neck is covered by 44, the thickest part of the trunk by 52 longitudinal series of small scales. Those of the upper parts are smooth, hexagonal; those of the sides approach the orbicular form, and have in the centre one, two, or three longitudinally placed minute tubercles. Similar tubercles are observed on each sides of the scale, forming the central abdominal series, which is composed either of entire hexagonal scales, a little larger than the rest, or they are longitudinally divided into pairs of smaller pentagonal scales, which have the appearance of being divided by an abdominal suture. A single individual taken in a fishing stake, off the coast of Province Wellesley was of the following dimensions:

	Feet.	Inch.
Length of the head,...	0	1½
Do. do. trunk,...	2	1½
Do. do. tail,.....	0	3½
	2	7½

Circumference of the neck, 2½; greatest do. of the trunk, 3½ inch.

The preceding, comprising all the hitherto known species of pelagic serpents, were observed chiefly at Pinang, among the abundant supply of fishes daily carried to the markets. Of their general habits some account appears in the *Transactions of the Zoological Society, London, Vol. II, p. 303*. One of them, *Hydrus schistosus*, is incredibly numerous in the Bay of Bengal, at Pinang and Singapore, far more so than any known terrestrial serpent. The fishing nets are

## REPTILES OF THE

hardly ever worked, but that one or more are among the contents. The other six species are of rare occurrence at Pinang and Singapore, as will be perceived from the disproportionally small number of each, examined during four years, viz. of *Laticauda scutata* : 3 ; *Hydrus striatus* : 2 ; *nigrocinctus* : 6 ; *gracilis* : 7 ; *pelamidoides* : 4 ; *pelamis* : 1.—Of these *Laticauda scutata* is excessively numerous in Timor, *Hydrus pelamis* in New Guinea, the Molucca Islands, and Otaheite, where the natives use it as an article of food. The remaining species, as far as is known, have been observed nowhere in such overwhelming numbers. Large individuals of every species are very seldom seen, it is the young individuals which frequent the coast, and it appears to be questionable, if even the largest observed are animals arrived at their full size. The large individuals are very ferocious ; the young ones are less so. Fortunately for the fishermen the light blinds these serpents, which when out of their proper element, become very sluggish and soon expire. This accounts for the safety of the class of men, whose daily calling brings them in immediate contact with animals, the wound of which is fatal. The fishermen in the straits of Malacca are aware of their danger, and therefore take care to avoid or destroy these reptiles while landing the fishes. The Malays denominate them "*Ular laut*," i. e. serpents of the sea ; among which, however, the innocuous *Acrochordus granulatus*, (Schneider), is also comprised as an inhabitant of the coasts.

### (BATRACHIA.)

#### FAM. CÆCILIDÆ, BONAPARTE.

(2412) *Gen.* ICHTHYOPHIS, Fitzinger, 1826.  
(*Epicrium*, Wagler, 1828.)

Head depressed, elongated ; muzzle obtuse ; maxillary and palatine teeth slender, pointed and couched backwards ; tongue entire with velvety surface ; eyes distinct, below and a little in front of which a fosset with a minutely tentaculated border ; body subfusiform with numerous close circular folds.

(2413) ICHTHYOPHIS GLUTINOSUS (Linne)  
VAR?

Of a uniform sooty brown, paler on the lower surface. Circular folds 254, of which 8 are caudal.

*Habit.*—Singapore.

The transversal diameter, taken at the occiput, is nearly equal to that of the root of the tail, and but little less than the uniform diameter of the trunk, which is between the 24th and 25th part of the entire length. Compared with a specimen of *Ichthyophis glutinosus* (Linne,) the present is of a more robust make ; the head is shorter, the muzzle blunter, and the transversal distance between the nostrils greater. The apex of the tongue and the arches formed by the teeth are

broader, more rounded. The palatal and upper maxillary teeth are blunter, and appear less recurved. Those of the lower jaw, the largest, present an appearance as if each was composed of two distinct parts : a lower which is vertical, broadly triangular, the posterior margin of which supports the upper part, which is curved backwards, and with rounded apex. The circular folds of the skin are fewer, more distant, and with the exception of the 3 or 4 anterior ones, complete. They are disposed in a manner similar to that of *Ichthyophis glutinosus*. The crowded imbricate scales appear to be of a somewhat rectangular form, less rounded than in *I. glutinosus* : in both their surface presents a minute net work.

The fosset of the upper lip is situated in the centre of a small tubercle. The circumference of the fosset is provided with a very short, minute, membranous tube, which, however, after the animal for some years has been preserved in spirits of wine, can scarcely any longer be distinguished.

Length of the head,...	0 $\frac{3}{4}$ Inch.
Do. do. trunk,...	10 $\frac{1}{8}$
Do. do. tail,.....	0 $\frac{1}{4}$

Entire length,..... 10 $\frac{1}{2}$  Inch.

Circumference of the neck, 1 ; of the trunk, 1 $\frac{2}{3}$  ; of the root of the tail,  $\frac{5}{8}$  inch.

A single individual was observed by Dr. Montgomerie at Singapore in 1843, in whose garden it was turned up with the earth, from about two feet below the surface, and from whom I received the specimen, shortly after it had been killed. Although, as stated, it differs in colours and in other characters from the description given by M.M. Dumeril and Bibron of *Ichthyophis glutinosus* (*Epicrium glutinosum*, Wagler, apud D. and B.) as well as from a specimen 10 $\frac{1}{2}$  inch in length, from Assam, the data appear to me insufficient with certainty to determine, whether the present is a distinct species, or a variety of *Ichthyophis glutinosus*, (Linne.)

#### FAM. RANIDÆ, BONAPARTE.

(2414) *Gen.* RANA, Linne.

Skin smooth, hinder extremities very long, formed for leaping ; toes palmated ; teeth in the upper jaw, and in the palate.

(2415) RANA LESCHENAUATI, Dum. and Bibr.

A line of minute conical tubercles along the sides of the body and across the throat. Above uniformly chocolate-coloured ; beneath and on the inner side of the extremities white, more or less vermiculated with pale brown. Iris narrow golden, rhomboidal, the two lower sides not joining each other, but leaving a small open space between them. Web of the toes orange with purple spots.



## MALAYAN PENINSULA AND ISLANDS.

*Habit.*—*Malayan Peninsula*. Pondicherry, Bengal.

The marbled appearance of the upper parts described by M.M. Dumeril and Bibron, does not exist during life, but is acquired when the frog is immersed in alcohol. The species is apparently not numerous. Of two, the larger was of the following dimensions :

Length of the head,.....	0 $\frac{7}{8}$ inch.
Do. do. trunk,.....	1 $\frac{8}{8}$
Do. do. anterior extremity, ..	1 $\frac{4}{8}$
Do. do. posterior, ..	3 $\frac{8}{8}$

*Rana bengalensis*, Gray, *Illustr. Ind. Zool.* is, perhaps, intended to represent this species.

(2416) *RANA TIGRINA*, Daudin.

SYN.—*Rana tigrina*, Daudin. *Hist. nat. Gren. &c.* p. 64, Pl. 20.

*Rana mugiens*, Daudin. l. c. Pl. 23.

*Rana mugiens*, Latreille. *Hist. Rept. F.* 2. p. 153, Fig. 2.

*La grenouille taureau*, Cuvier, *R. A.* 1. Ed.

*Rana tigrina*, Merrem.

*Rana limnocharis*, Boie, MS.

*Rana cancrivora* Boie, MS.

*Rana cancrivora*, Gravenhorst.

*Rana picta*, Gravenhorst.

*Rana Brama*, Lesson.

*Rana rugulosa*, Wiegmann.

*Rana vittigera*, Wiegmann.

*Rana cancrivora*, Tschudi.

*Rana tigrina*, apud Dumeril and Bibron.

"Kodok, Katak, Lancha" of the Malays.

Body and limbs above golden greyish-olive or brown, in some with large rounded black spots, and with a yellow line from the muzzle down the back, and a similar broad band from the side of the muzzle to the loins. Beneath and on the innerside of the limbs white or yellow, with or without black spots. Iris burnished golden, the lower half sometimes black, pupil elliptical rhombic.

*Habit.*—*Malayan Peninsula and Islands*. Coromandel, Bengal, Assam, Tenasserim, Java, Sumatra, Timor, Philippines, Canton Province.

The species is excessively numerous in valleys and hills, after heavy falls of rain, but adult individuals are of comparatively rare occurrence. At night the deep short baying sound denotes its presence. The largest individual measured :

Length of the head,.....	1 $\frac{4}{8}$ Inch.
Do. do. trunk,.....	3 $\frac{4}{8}$
Do. do. anterior extremities, ..	2 $\frac{4}{8}$
Do. do. posterior,.....	7 $\frac{4}{8}$

(2417) *Gen. MEGALOPHRYS*, *Kuhl.*

Head very large, broader than the trunk, depressed ; rostral angle and upper eyelid elongated to a point. Tympanic membrane hidden. Nostrils lateral, below the rostral angle. Mouth enormous ; tongue circular, slightly notched behind. Posterior extremity with a short interdigi- tal membrane.

(2418) *MEGALOPHRYS MONTANA*, Wagler, Var.

Above pale greyish brown, with a small black triangular tubercle on each shoulder, and a similar in the centre of the sacrum. From the sides of the muzzle a black band edged with white, continued round the orbit, and then downwards, obliquely over the dark brown cheeks. Outside of the limbs indistinctly marked with black. On the elbows, knees and heels a large round black spot. Posterior margin of the limbs rose-coloured. Fingers and toes yellowish white with transverse black bands. Palms and soles black. Throat and chest sooty with a large white blotch on each side of the latter. Abdomen and inner side of the limbs sooty, vermiculated, and spotted with white. Iris rich golden brown, with minute black net-work. Pupil vertically rhomboidal.

*Habit.*—*Pinang*

Wagler's short description of *M. montana* is drawn up from a preserved specimen, which apparently is also the case with that communicated in *Erpetologie Generale*. From the latter the present animal differs both in colours and in the following particulars. The muzzle forms a pointed lobe resembling the upper eyelids, but smaller. The nostrils are transversely oval, protected by a membranous valve fixed to their lower margin. The upper eyelids are perfectly smooth. The nearly vertical cheeks are above bordered by an angular ridge terminating near the shoulder ; behind by a short curved ridge, which at the angle of the mouth forms a small pointed lobe. The back is smooth without transversal folds, but bordered on each side by a sharp whitish ridge commencing at the upper eyelid, converging towards the cloacal orifice. On the shoulder, near the triangular tubercle, the ridge is enclosed between two short black lines.

Two males were at different times captured on the Pentland Hills, at an elevation of about 1800 feet. One was found in a dark room, where it was observed remaining motionless during several successive days. Its form and colours caused it at first to be mistaken for a withered leaf. The second was taken on a tree. The iris is vertically contracted by exposure to the light. The male has no vocal sacs. The larger was of the following dimensions :

Length of the head,.....	0 $\frac{7}{8}$ Inch.
Do. do. trunk,.....	1 $\frac{7}{8}$
Do. do. anterior extremities, ..	2
Do. do. posterior,.....	3 $\frac{2}{8}$

FAM. HYLIDÆ.

(2419) *Gen. LIMNODYTES*, [The denomination has with propriety been substituted for the inadmissible *Hyla Rana*, Tschudi.] *Dumeril and Bibron.*

Tongue long, narrowed in front, widened, forked free behind, teeth on the vomer, ferru-

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two groups, between the internal openings of the nostrils; tympanum distinct; Eustachian tubes middling; four fingers free; toes completely or partially webbed; sub-digital disks slightly dilated; process of the first os cuneiforme blunt, very minute; males with vocal sacs; sacral transversal processes not dilated.

(2420) *LISMNODYTES ERYTHRÆUS*, (Schlegel.)

*Hyla erythræa*, Schlegel.

*Hylarana erythræa* Tschudi.

*Limnodytes erythræus*, Duméril and Bibron.

Back and sides brown or reddish olive; a longitudinal silvery white band from the eye to the loin; a second similar from the nostrils, parallel with the former. Beneath silvery white. The inner side of the extremities spotted and lineated with brown. Iris golden brown; pupil vertically rhomboidal.

*Habit.*—*Malayan Peninsula*. Java, Arracan.

Of three individuals observed, the largest was of the following dimensions:

Length of the head,.....	0 $\frac{7}{8}$ Inch.
Do. do. trunk,.....	1 $\frac{6}{8}$
Do. do. anterior extremities, ..	1 $\frac{6}{8}$
Do. do. posterior,.....	4 $\frac{2}{8}$

(2421) *Gen.* *POLYPEDATES*, *Tschudi*, *apud Duméril and Bibron*.

Terminal joints of the fingers and toes widened into a large disk; fingers slightly webbed at their base; Eustachian tubes large; in other particulars resembling *Limnodytes*.

(2422) *POLYPEDATES LEUCOMYSTAX*, (Gravenhorst.)

*Syn.*—*Hyla maculata*, Gray, *Illust Ind Zool*,

*Hyla leucomystax*, Gravenhorst,

*Polypedates leucomystax*, Tschudi, *apud Dum. and Bibr*,

Upper parts changeable: buff, ashy grey, chocolate brown, tinged with rose or lilac, minutely or largely spotted with black. Upper lips white. A blackish band occupying the sides of the head, from the muzzle to tympanum. Beneath whitish or grey, uniformly, or minutely dotted with black. Posterior surface of the thighs blackish or vermiculated with white. Iris silvery or buff; pupil horizontally rhomboidal.

*Habit.*—*Pinang, Singapore, Malayan Peninsula*. Malabar and Coromandel Coast, Bengal.

This species has the power of changing its colours as above described. Although it inhabits Singapore and the sultry plains of Bengal, it appears not to occur in the valleys at Pinang, but to affect the hills, at an elevation of more than 2000 feet, with a mean annual temperature of about 71°.

Length of the head,.....	0 $\frac{2}{8}$ Inch.
Do do trunk,.....	1 $\frac{6}{8}$
Do do anterior extremities	1 $\frac{6}{8}$
Do do posterior,.....	4 $\frac{2}{8}$

## FAM. BUFONIDÆ, FITZINGER.

(2423) *Gen.* *BUFO*, Laurenti.

Body inflated; skin warty; parotids porous; toes united by a rudimentary membrane; no teeth.

(2424) *BUFO MELANOSTICTUS*, Schneider.

*SYN.*—*Bufo scaber*, Daudin

*Bufo bengalensis*, Daudin.

*Bufo scaber*, Latreille.

*Bufo scaber* Daudin, *Hist. Rept.*

*Bufo bengalensis*, Daudin, *Hist. Rept.*

*Le Crapaud de Bengale*, Lesson.

*Bufo dubia*, Shaw, *apud Gray*, *Illust. Ind. Zool.*

*Bufo carinatus*, Gray, *Illustr. Ind. Zool.*

*Bufo melanostictus*, *apud Gravenhorst*,

*Bufo scaber*, Tschudi.

"Kakong" "Katak puru," of the Malays of the Peninsula.

Above earthy brown, grey or buff, in some marbled with black; lips, parotids, crests of the head, points of the tubercles, and last joints of fingers and toes, sooty, or black. Beneath buff, in some vermiculated with black. Iris golden brown; pupil transversely rhombic.

*Habit.*—*Malayan Peninsula and Islands*. Java, Tenasserim, Bengal, Coromandel.

In the Malayan countries this species swarms in valleys and hills. It has in a slight degree the power of changing its colours, and it utters a chirping, plaintive sound. The largest individual examined, measured:

Length of the head,.....	1 Inch.
Do. do. trunk,.....	3
Do. do. anterior extremities,....	2 $\frac{2}{8}$
Do. do. posterior extremities, ..	4 $\frac{2}{8}$

(2425) *Gen.* *HYLÆDACTYLUS*, Tschudi.

Tongue an oval disk, thick, free only at the lateral margins. Palatal teeth. Eustachian tubes very minute. No parotids. Four free fingers with the terminal joint widened, truncated. Five toes united at the base by a very small membrane, the terminal joint not widened; sole with two soft tubercles between tarsus and metatarsus. Sacral transversal processes forming triangular palettes.

*HYLÆDACTYLUS BIVITTATUS*, N. S.

Upper parts and outside of extremities brownish olive with distant small black spots. Head from the muzzle to the middle of the orbit whitish. A broad whitish band edged with black from the posterior angle of the eye, along each side to the loins. A shorter, oblique, similar band from the posterior angle of the eye. Beneath whitish, vermiculated with brown. The throat of the males black. Iris golden brown; pupil transversely rhombic.

*Habit.*—*Malayan Peninsula*.

From *H. baleatus*. Tschudi, the present species differs both in colours and in the following parti-



## PENINSULA OF INDIA.

culars. The profile from the nose to the coccyx forms a considerable arch, the highest part of which is the centre of the back. The male is provided with a vocal sac, the large openings of which are situated on each side of the tongue, and their presence is easily detected by the laxity of the (black) skin of the throat, which forms a broad transversal fold. Between the small openings of the Eustachian tubes the palate presents a considerable transversal fold of the skin, the free margin of which is fringed, which gives it the appearance of a row of teeth. A similar fold has been observed by M.M. Dumeril and Bibron in the genera *Plectropus*, Dum. and. Bibr. and in *Uperodon*, Dum. and. Bibr. In front of this fold is another smaller, between the orbital protuberances. Behind each of the large internal openings of the nostrils, is an arched bony ridge, which in *H. baleatus* supports a few teeth. In the only individual of the present species examined, the free margin of the ridge is cutting, but without teeth. Over the Symphysis of the lower jaw there is a small pointed process, fitting into a corresponding cavity in the margin of the upper jaw. In this species no less than in *Uperodon marmoratum*, Dum. and Bibr. nearly the whole of the thigh is hidden by the skin of the body, so that the posterior extremities are free but from a little above the knees. This character does not appear to exist in *Hylædactylus baleatus*, as it is not mentioned in the description of that species by M.M. Dumeril and Bibron. On the anterior part of the back appear some indistinct rounded elevations; the rest of the upper parts is smooth. The skin of the throat and abdomen presents numerous transversal wrinkles, and is covered with minute tubercles. The toes are more slender than the fingers, and their last joint, although flattened, is not so broad, as that of the fingers, which is of a somewhat triangular form, truncated in front. In *H. baleatus* the fingers are longer than the toes. In the present species however the longest finger, the third, is nearly one-fourth shorter than the fourth toe.

The only individual which I had an opportunity of examining, after its death, was a male taken in a field near Malacca. It was of the following dimensions :

Length of the head,.....	0 $\frac{3}{4}$ Inch.
Do. do. trunk,.....	2 $\frac{2}{3}$
In a straight line from the muzzle to coccyx, following the arch of the back,.....	3 $\frac{1}{2}$
Length of the anterior extremities	1 $\frac{2}{3}$
Do. do. posterior extremities, following the posterior margin,	2 $\frac{1}{2}$

In the nomenclature adopted in the preceding Catalogue it has been Dr Cantor's wish strictly to adhere to the rules proposed by the Committee of the British Association for the Advancement of Science, published in the *Report of the twelfth*

*Meeting*, Rules with which he regrets he was unacquainted before the publication of the Catalogue of Malayan Mammalia.

Fort William, June 1st, 1847.

### ADDENDA.

P. 609. To SYN. *Emys Crassicollis*, Bell, add, apud Horsfield : Life of Raffles.

P. 614. To *Gymnopus gangeticus*, (Cuv) add: SYN. *Trionyx ocellatus*, Hardwicke (Young), apud Jaquemont : Atlas : Pl. 9.

P. 622. To SYN. *Crocodylus biporcatus*, Cuv. add: apud Horsfield : l. c.

P. 903. To SYN. *Python des isles de la Sonde*, add: Cuvier, R. A.

(2426) REPTILES of the *Peninsula of India*.—By T. C. JERDON, Esq. *Madras Medical Service*.—Beng. As. Soc. Journ. No. V. of 1853, p. 462, to 479.

### CHELONIA.

FAM. TESTUDINIDÆ—or Land Tortoises.

(2427) *Gen. TESTUDO*.

Fore feet with 5 fingers, hind do. with 4 nails, —Carapax of one piece—Sternum fixed in front.

(2428) TESTUDO ACTINODES, Bell.

SYN. *T. stellata*, Schw. and Gray.

*T. geometrica*, Daud. and Shaw.

*T. elegans*, Schœpf. and Shaw.

*T. geometrica*, apud Hutton, *J. A. S.* VI. 689, and plate XXXVIII.

*Kaynchwa*, H.

*Dasari*, Tambel, Teloog; vulgo *Adavi*, *Moonigadoo*, or Jungle deaf-fellow.

Indian Land Tortoise. Eng.

This Tortoise is tolerably common in the low Jungles of the Carnatic, and throughout the whole of the Peninsula. Length of the shell of one about 6 inches. [Capt. Thos. Hutton gives much larger dimensions *loc. cit. supra*; and we have a specimen which I picked up dead in a street of Calcutta, the length of carapax of which (in a straight line) exceeds 12 inches. Three living specimens which I received from Vizagapatam 5 or 6 years ago, certainly did not grow much in the interim, and the carapax of one of these recently dead, and added to the Society's museum, measures 8 $\frac{1}{2}$  in. It also inhabits Ceylon; but not Lower Bengal.—E. B.]

FAM. ELODIDÆ—Marsh Tortoises.

(2429) *Gen. EMYS*.

[For generic characters, vide Journ. As. Soc. 1847, p. 608. I think it superfluous to repeat in this journal the characters so lately laid down in Dr. Cantor's most admirable Catalogue.]

(2430) EMYS TRIJUGA, Schw.

SYN. *E. Belangeri*, Lesson. *Goonta*, Tambel, Tel.

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Carapax olive or brown, three keeled, edges smooth.

By no means common in the south of India, and chiefly to be found in deep tanks and large wells. [Hab. also Central India (vicinity of Chaibasa); but in Ceylon it appears to be replaced by *E. SEBÆ*, Gray. According to M.M. Dumeril and Bibron, M. Dussumier procured a young individual in a lake near Calcutta (doubtless the salt-water lake); but we have never heard of another instance, although we have seen multitudes of *Emydes* from the salt-water lake and its vicinity.—*Cur. As. Soc.*]

Length of shell of one 8 inches.

(2431) *EMIS TENTORIA*. [Col. Sykes procured another *EMYS* in the Bombay Dnkhun, *E. TENTORIA*, Gray, *P. Z. S.* 1834, p. 54, and the supposed adult *E. TECTUM* of Hardwicke's 'Illustrations.' The Society's Museum contains an adult procured by Sir A. Burnes in Sindh, and we have also a young specimen from the river Hughly. The species is most nearly affined to *E. TECTUM*, Bell, and has the same peculiar form of the fifth vertebral plate; but the fourth is quadrilateral and elongate, the third has a broad transverse posterior margin, the keels of the vertebral plates (especially that of the fourth, so developed in *E. TECTUM*), are much less prominent at all ages, the entire carapax is broader and flatter, and the abdominal plates are brown-black with pale margins, and occasionally one or two pale central spots,—instead of whitish, with two or three strongly contrasting blackish marks on each, as in *E. TECTUM*. Carapax of adult 7 in. long; that of adult *E. TECTUM* 6½ in.

I am nearly certain that the small specimen is from the vicinity of Calcutta, and that I kept it alive for some time, but did not then distinguish it from *E. TECTUM*.

(2432) Three species of restricted *EMYS* are extremely common in the neighbourhood of Calcutta, viz. *E. TECTUM*, *E. HAMILTONII*, Gray, (of which the carapax of our largest specimen measures 5½ in. in a straight line,) and *E. THURGHII*, Gray, which attains to a much larger size than the others, though adults are not often obtained. Carapax of adult from 20 to 22 in., in a straight line.—*Cur. As. Soc.*

FAM. POTAMIDÆ—or River Tortoises.

(2433) *Gen. CRYPTOPUS*—Dum. and Bibr.

Carapax with a narrow cartilaginous border—sternum wide, flexible in front and behind completely to conceal the extremities.

(2434) *CRYPTOPUS GRANOSUS*—Dum. and Bibr.

SYN. *T. granosa*, Shæpf.

*T. granulata*, Daud and Sh.

*Trionyx coromandelicus*, Mesc. Geoff., Less.

*Emyda punctata*, Bell and Gray.

*Tambel* and *Goorada gadoo*, Tel.

Shagreen freshwater Tortoise. *Eng.*

This is an extremely common species in the south of India and is found in tanks, rivers, wells, and pools of water, burying itself in the mud with great celerity. It is frequently brought to the Madras market and is eaten by many of the people there.

Length of shell of one, 3½ inches—but it becomes much larger. [Extremely common in Lower Bengal, and here also much eaten by certain classes, as indeed are all other *Testudinata*. It likewise inhabits Ceylon.—*Cur. As. Soc.*]

(2435) *Gen. GYMNOPUS*—Vide Cantor, l. c. p. 614.

(2436) *GYMNOPUS CARTILAGINEUS*—Vide Cantor, l. c. p. 615.

I have observed this species in the Godavery, the Beema and other rivers of the north west of the peninsula, but have no specimen at present.

(2437) *GYMNOPUS INDICUS*, (Gray), Vide Cant. l. c. p. 616.

I have very lately procured a specimen of this large river Tortoise taken in a net at Mahe on the Malabar Coast, where, however, it is considered rare.

Length of carapax 30 inches. [We have succeeded in obtaining only one small specimen of this in the vicinity of Calcutta.—*Cur. As. Soc.*]

FAM. THALASSIDÆ—or Sea Turtles.

(2438) *Gen. CHELONIA*—Vide Cantor, l. c. p. 617.

(2439) *CHELONIA VIRGATA*—V. Cant. l. c.

I have procured this Turtle on the East Coast of India. [Very numerous on parts of the E. coast of the Bay of Bengal.—*Cur. As. Soc.*]

(2440) *CHELONIA MACULOSA*—Cuvier.

Vertebral plates larger than broad, marked with yellow in an olive brown ground.

This Turtle is occasionally caught by the fishermen both on the East and West Coasts of India.

(2441) *CHELONIA OLIVACEA*, ESCHSCHOLTZ—Cant l. c. p. 619.

Very common in the Bay of Bengal, where I have seen many captured by ship lascars swimming out during a calm. Length of carapax average about 2 feet. [Abundant at the mouth of the Hughly.—*Cur. As. Soc.*]

(2442) *CHELONIA IMBRICATA* (L.) V. Cantor, l. c. p. 619.

I have quite recently procured this Turtle at Tellicherry on the Malabar Coast. [In the Society's Museum is a small specimen, procured in one of the Sunderbund rivers.—*Cur. As. Soc.*]



# PENINSULA OF INDIA.

## CROCODILIDÆ—Bon.

(2443) *Gen. CROCODILUS*—V. Cant. l. c. p. 621.

(2444) *CROCODILUS PALUSTRIS*, Lesson—V. Cant. l. c. p. 621.

This Crocodile, pronounced by some erpetologists only a variety of the Crocodile of the Nile, and so considered by Cantor, is very common in all the rivers and back-waters of Malabar and the West of India, very rarely seen out at sea. I have not seen it from the East Coast. It does not attain the demensions of the next species, and is considered very harmless by the natives.

(2445) *CROCODILUS POROSUS*—Schn. Cantor, l. c. p. 622.

This, the larger and fiercer of our two Crocodiles, is found in various localities both on the East and West Coasts, and is the species so abundant in the fort ditch at Vellore. It is of very rapid growth. An egg brought from Vellore to Walter Elliot, Esq., was hatched in the Government house compound, and in eight years had increased to the length of 8 or 9 feet, becoming so powerful as to destroy a full grown buck Antelope which had come to drink water at the tank where it usually resorted.

Both of these species of Crocodile are called Alligators by the English in India; erroneously so of course, as no Alligators have as yet been found in the old world.

## FAM. CHAMÆLEONIDÆ.

(2446) *Gen. CHAMÆLEO*, Laurenti.

Feet thin with 5 fingers joined to the nails into two lobes, one of two, the other of three fingers. Skin granular. Eyes large, covered by the scales of the eyelid except one small round aperture. No visible tympanum.

(2447) *CHAMÆLEO ZEYLONICUS*—Laur.

Dorsal crest short; abdominal crest with the spines long and somewhat distant. Colour green.

Syn. *C. vulgaris*, var. B, Dum. and Bibr. *C. zebra*, Bory de St. Vinc. *C. calcaratus*, Merr.

I have no hesitation in considering this Chameleon distinct from the African one, as well on account of the slight but permanent structural distinctions (the abdominal ridge being in the African one composed of very short and closely set spines), as the difference of locality, and the great difference in the change of colour of the two. In our Indian one, the only change produced is from one shade of green to another. In a state of quiescence it is usually very pale green, sometimes dark blackish green; but when excited it is mottled or *zebra'ed* very prettily with dark transverse blotches on a pale ground. I never saw any pure yellow, or red in any state. A very fine one which we long kept, as-

sumed a tolerably pure yellow ground tint occasionally, with black markings.—*Cur. As. Soc.*

It is found in all the wooded districts of India. It is used in medicine by some of the native doctors, and may generally be procured in the Madras market.

Length of one 10 inches, of which the tail is more than half.

(2448) *CHAMÆLEO PUMILUS*—Latreille.

Head tuberculated; dorsal crest continued over the tail. Some large circular scales mingled with the small and unequal granulose ones.

I possess a specimen of this small Chameleon in spirit, which was said to have been taken near Coonoor on the Nilgherries.

Length  $5\frac{1}{2}$  inches, of which the tail is nearly 2.

## FAM. GECKONIDÆ, Bonaparte.

(2449) *Gen. HEMIDACTYLUS*, Cuvier, Cantor, l. c. p. 628.

(2450) *HEMIDACTYLUS TRIEDRUS*—Daud.

Syn. *Deowur bullee*, Tel., of the Yanadees.

Many large triedral tubercles mixed with the other scales—tail somewhat rounded—several large transverse brown bands marked with large white triedral scales—7 or 8 femoral pores in each thigh in the males.

This very handsomely marked Gecko is rarely found in houses, being chiefly met with in jungly places, on rocks and trees, in all parts of the country, but is nowhere common.

Length of one 7 inches, of which the tail is about half.

(2451) *HEMIDACTYLUS SUBTRIEDRUS*—n. sp.?

*H. TRIEDRUS*—var.?

*Sookka bullee* of the Yanadees.

Differs from *TRIEDRUS* in somewhat shorter head, in the scales of the throat and muzzle being smaller in its shorter head; fewer dark bars on the back and fewer of the white tubercles; and in the triedral scales generally being smaller. It is equal in size to *TRIEDRUS*, and the number of femoral pores is the same. Colours much as in *TRIEDRUS* but paler.

Length of one  $6\frac{1}{2}$  in., of which the tail is more than half.

The Yanadees, a peculiar jungle race in the Nellore district, who have a considerable knowledge of reptiles; pronounced this to be a distinct species from the last, and gave it a peculiar name or I should have put it down as a casual variety of *TRIEDRUS* without closer inspection. It is found chiefly in rocks, seldom entering houses. It forms a link between *TRIEDRUS* and *MACULATUS*.

(2452) *HEMIDACTYLUS MACULATUS*—Dum. and Bibr. Qu. II. *FÆNATUS*, D. and B. ? *Our. As. Soc.*

Brown or olive-green with dark marks; back furnished with numerous sub-triedral tubercles.

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This is the most common species of Gecko in the South of India, but never attains here the dimensions stated by Dumeril and Bibron. It is very subject to variation both in the ground tint and the dark markings, which it appears to have the power of deepening or reducing.

Length of an average specimen  $4\frac{1}{2}$  inches, of which the tail is  $2\frac{4}{10}$ ths.

(2453) *HEMIDACTYLUS PUNCTATUS*—n. sp.

Back with some larger conical scales, and sub-caudal scutæ very large; scales of abdomen dotted, brown above; limbs and tail reddish with dark bands: a pale yellow streak from muzzle to tail bordered beneath by a dark line; another dark line from nostrils to behind the eye—beneath yellowish white—some of the sub-caudal scutæ orange.

Length  $3\frac{3}{8}$  inches, of which the tail is  $1\frac{1}{2}$ .

I procured a single specimen of this small Gecko lately, in a house at Tellicherry. At first glance, I took it for *maculatus*. It appears very similar to *H. frenatus*, but I can find no pores, and the thumb appears as well developed as in *maculatus*.

(2454) *HEMIDACTYLUS LESCHENAULTII*—Dum. and Bibr.

Small tubercles scattered sparingly among the very small scales of the back, 13 femoral pores in each thigh. Adult pale gray above; young with dark markings and tail annulated black and white.

Length of one nearly 6 inches, of which the tail is  $2\frac{5}{10}$ ths.

This species of Gecko is very common throughout the South of India in houses. I have not observed the mode of coloration described by Dumeril and Bibron.

(2455) *Gen. HOMONOTA*. Gray.

(2456) *HOMONOTA FASCIATA*. Jerdon.

Body covered above with large imbricated, keeled and pointed scales, below with much smaller hexagonal scales, ranged in oblique series: the throat and limbs studded with minute hexagonal scales, larger on the thighs; and the head uniformly covered with hexagonal plates, smaller than the scales of the back. A range of simple labial plates above and below, the rostral larger, bordered on the lower jaw with a series of small oval plates, and these with a second series of smaller oval plates. Tail wanting in the specimen. The pupils appear to be round. Colour plumbeous brown, with 7 or 8 irregular broad whitish cross-bands, formed each of three or more contiguous spots. An omega-like mark on the forehead. Length of head and body  $1\frac{1}{2}$  in. of head  $\frac{3}{8}$  in. This specimen was sent many years ago to the Society's museum by Mr. Jerdon.—*Cur. As. Soc.*

(2457) *Genus GYMNOACTYLUS*. Wiegman

—Vide Cantor l. c. p. 861

(2458) *GYMNODACTYLUS INDICUS*—(Gray.)

SYN.—*Goniodactylus indicus*, Gray.

Scales of body and tail small, equal; those beneath the tail larger.

This species, lately [Ann. and Mag. of Nat., Hist., Dec. 1846, p. 429.] described from specimens sent home by myself, is found on the Nellocherries, concealing itself under stones in the day time. I have procured it on the top of Dodabetta, the highest mountain of the group, and have also found it in Coorg. Its colours when fresh are a mottled brown, or greenish-brown, with a row of orange-yellowish spots along the back edged darker, and a line of similarly coloured spots on each side; lips also of the same tint, and the lower portion of the tail.

Length of one  $2\frac{4}{10}$  inches, of which the tail is  $1\frac{2}{10}$ th.

(2459) *GYMNODACTYLUS MALABARICUS*—n. sp.

Scales of the back uniform, small, granulose, a few at the root of the tail between the two hind legs smaller, those in the tail above larger, imbricated; a few small spines at the root of the tail: dark brown above, marbled with black spots and a white spot on the nape.

Length of one  $2\frac{4}{10}$  inches, of which the tail is about half.

I have only very recently procured this small Gecko from the forest of Malabar, where it frequents large trees and rocks. It is generally to be found on those large trees, whose base is protected by buttresses, in the inequalities of which it finds a secure retreat, and occasionally it hides itself under a cleft in the bark. The dark markings on its back are edged lighter, and it is of a bluish white colour beneath. It is of a more slender habit than the preceding species.

(2460) *GYMNODACTYLUS LITTORALIS*—n. sp.

Very slender form, scales of back small, equal those on the muzzle larger; beneath the tail a series of large six-sided scales. Colour pale brown, with a series of paler marks along the and tail, a black spot on the nape, the chin and throat pale yellow.

Length  $2\frac{3}{10}$  inches, of which the tail is  $1\frac{1}{10}$ th.

I procured a single specimen of this well marked species of Gecko in a ware-house on the Sea Coast in Malabar, and have not yet been fortunate enough to find another.

(2461) *GYMNODACTYLUS MYSORIENSIS*—n. s.

Scales of the back uniform, granulose, with 2 or 3 rows of spines on each side, and on the tail; tail beneath with a triple series of large uniform scutæ.

Head and back covered with small granulose scales, and two or three distant rows of spines on each side and extending along the tail; chin and throat covered with small hexagonal scales, gradually changing to rounded imbricated scales.



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which cover the abdomen ; scales of tail imbricated, with 8 rows of larger nail-shaped scutæ beneath ; scales of the basal joints of the fingers and toes, enlarged, nail-shaped.

Body above greenish-brown, with a light stripe down the centre of the back, and a series of dark brown marks on the head, back and sides ; legs and feet banded ; beneath bluish-white ; chin, throat and anterior portion of palpebræ bright yellow.

Length  $2\frac{1}{2}$  inches, of which the tail is  $1\frac{1}{4}$ .

I have quite recently found this small and very distinctly characterized species of Gecko at Bangalore, frequenting rocks and also entering out-houses. The young has the tail flesh-coloured : 2 femoral pores on one side and 3 on the other.

### FAM. IGUANIDÆ.

(2462) *Gen.* CALOTES, Cuv.—Vide Cant, l. c. p. 636.

(2463) CALOTES VERSICOLOR, (Daud.)

Syn. *Agama Tiedmanni*, Kuhl.—*A. vulturosa*, Harl.

Two spines on each side of the nape. No fold on the neck. Tail conical. Scales large, keeled.

This is the most common and extensively distributed lizard in the country, being found everywhere in gardens, avenues and jungles. Though not a Chameleon in structure, it is yet one in habit, and much more so than our Chameleon. Its usual tints are a pale drab or fawn colour, but this it changes to bright red, to black and to a mixture of yellow red and black. This change is sometimes confined to the head, at other times diffused over the whole body and tail. A common state to see it in, is seated on a hedge or bush with the tail and limbs black, head and neck yellow picked out with red, and the rest of the body red. I am inclined to think that this display of colours is merely seasonal. It only occurs in the males, the females being uniformly and plainly coloured. The young has a pale band on each side of the body from the eye to the tail, and a series of dark bands on the back. Mr. Blyth mentions, in a notice of this lizard in the Journ. As Soc. for 1842, p. 870, that its usual colour is \* \* \* \*. This is somewhat remarkable and I should doubt if it was the same species. Are the changes mentioned here observed in Calcutta ? [I never saw any yellow in a Bengal specimen ; and some which Dr. Kelaart sent me alive from Ceylon were perfectly identical with the Bengal reptile. It is chiefly during the months of May and June that the species here displays its fine colours ; which generally are—head and neck, and more or less of the fore-part of the body, bright red ; rest of body and limbs dark greenish-brown ; and a great black patch on the shoulder. The female is small-

er, and deposits her 8 to 16 eggs very commonly in a flower-pot, burrowing 4 or 5 in. into the hard dry soil, and finally covering them up most carefully, so that no appearance remains of the ground having been disturbed. The young appear in about 8 or 9 weeks. I have seen a two-thirds grown lizard of this species carry off and partly swallow a Scolopendra nearly of its own length.—*Cur. As. Soc.*]

This and the other species of Calotes are essentially tree lizards, seeking their prey often on the ground, but always retreating up trees when in danger.

Length of one specimen 18 inches, of which the tail is 12.

(2464) CALOTES NEMORICOLA, nov. spec.

One detached spine in front of 2 or 3 small ones on each side of the nape. A fold of skin on the shoulder, scales of the sides very large, not keeled, those of the abdomen much smaller, keeled. Dorsal crest extending only about one-third along the back ; colour green.

I only procured one specimen of this lizard near the foot of the Coonoor ghat of the Nilgherries. Compared with *versicolor*, the large smooth scales are the most prominent feature of distinction. The scales at the base of the tail above are of rather large size, keeled and pointed. The tympanum is large : where the dorsal crest terminates, the scales of the ridges are pointed.

Length of my specimen 18 inches, of which the tail is 8.

(2465) CALOTES ROUXI.—Dum. and Bibr.

An oblique fold in front of each shoulder. Scales of the sides small, nearly as large as those of the abdomen. Base of the tail above furnished with much larger scales, somewhat angular. Colour pale brown with darker bands.

I have lately procured from the forests of Malabar a species of lizard, which appears to correspond with the description of *C. Rouxi* from the Burmese country. I found it more abundant than elsewhere in a small wooded island known as Pigeon I., about 20 miles S. S. W. from Honore. The usual change of colour consists in the head and nape becoming brick red, and the rest of the body blackish.

Length of one 11 inches, of which the tail is  $7\frac{1}{4}$ . [This coloration is altogether dissimilar from that described of my supposed *C. Rouxi* from Newera Elia, vide *J. A. S.* XXI, 354.—*Cur. As. Soc.*]

(2466) CALOTES VIRIDIS, Gray.

Nape with 2 isolated spines above the ears ; a high crest on nape and shoulders diminishing along the back and lost on the root of the tail, scales large above, smaller beneath, those at base of the tail largest. I always considered that the very pretty green lizard which I had procured

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from Travancore and the southernmost portion of Malabar agreed tolerably exactly with the description of *C. ophiomachus*, but Mr. Gray has described it as new by the name of *viridis*. Ann. Mag. Nat. Hist. XVIII, page 429. [There appears to be some confusion here. The present species we consider to be, decidedly, *C. OPHIOMACHUS*, as figured by Daudin; and its range extends to Ceylon and to the Nicobar islands. The *C. VIRIDIS*, Gray, was long ago presented by Mr. Jerdon to the Society, and it does not correspond with Mr. Jerdon's present descriptions, either of this or of the next species; yet his figure sent of the supposed *OPHIOMACHUS* would seem to present *C. VIRIDIS*.—*Cur. As. Soc.*]

The colour is a bluish-green with 4 or 5 transverse stripes of reddish white, and some of the scales of the throat are edged with orange.

Length  $16\frac{1}{2}$  inches, of which the tail is nearly 13.

### (2467) *CALOTES OPHIOMACHUS*.

A small crest of long spines on each side of the nape. Dorsal crest extending to the root of the tail, which is long, conical, and very thin towards the end. Green; with transverse bands.

Mr. W. Elliot possesses a rough drawing and brief description of a green lizard, distinct from any of those previously described, which I believe to be identical with the *C. ophiomachus* of authors. He procured the specimen in Dharwar. Its dimensions were as follow:

Length 14 inches, of which the tail is 10.

The drawing represents the colours to be pale green with dark transverse bands, interrupted by a pale longitudinal line from ear to tail.

### (2468) *Gen. SALEA*, Gray.

Differs from *Calotes* in the series of scales pointing directly backwards, or running in longitudinal lines; not as in *Calotes*, where the points are directed upwards, nor as in *Bronchocele*, where they are directed downwards.

### (2469) *SALEA JERDONI*, Gray.

Nuchal and dorsal crest formed of elongated compressed scales; tail with a keeled crest.

This pretty lizard, described by Mr. Gray from specimens sent home by me, is found in the Nilgherries where it frequents bushes, hedges and gardens. [Hab. also Ceylon (Newera Elia), whence a specimen was presented by Dr. Kelaart to the Society's Museum, since purloined together with a *SALEA* from the Nicobars.] Its colour is a bright grass green marbled with brown, some red marks on the head and nape and a few white scales on the sides. It does not appear to possess the faculty of changing its colours.

Length of one  $9\frac{1}{2}$  inches, of which the tail is  $6\frac{1}{2}$ .

Another, from Mirzapore (?), presented by the late Major Wroughton, may be described as,

(2470) *SALEA GULARIS*, Blyth. Length  $16\frac{1}{2}$  in., of which the tail measures  $11\frac{1}{4}$  in. Structure typical. Hind-limb reaching to the articulation of the lower jaw. Series of 14 lengthened spines from occiput to behind the shoulders, increasing in length to the 7th and 8th, and then successively diminishing. Gular faun, or dewlap, well developed. Two inconspicuous ridges of slightly lengthened spines above the tympanum.—*Cur. As. Soc.*]

### (2471) *Gen. SITANA*, Cuv.

Four toes on the hind-feet, no dorsal crest, a large dewlap in the males.

### (2472) *SITANA PONTICERIANA*, Cuv.

Fawn-coloured, rhomboidal dark spots on the back, and a pale longitudinal streak from ear to tail. Male, in breeding season, with a large tricoloured dewlap.

This common ground lizard is distributed over all India, I believe, but is rare in the wooded districts, frequenting the open country, field and low copses: on the approach of danger, it runs with great rapidity, tail erect, and conceals itself in any crack in the ground or hole, or under a stone or bush. Notwithstanding its activity, it is the common prey of harriers, buzzards, hawks and eagles. I have not seen the beautiful dewlap (blue, black, and red) developed in the south of India, nearly to the extent that appears to take place in the north, and there it attains a greater size. The colours of the dewlap are only exhibited during the pairing season, and it then becomes larger than previously. At this time, too, some blue marks are observable on the nape and back, that on the nape indeed forming a kind of crest more conspicuous now, the colours in general too are deepened, and the quadrangular marks on the back and barring of the limbs very distinct. The name *Sitana*, said by Cuvier to be the name by which it is known at Pondicherry, is a Latin termination of the word *Shaitan* or Devil, a name sometimes applied to it by the Musulmans of S. India.

Length of one  $6\frac{3}{4}$  in., of which the tail is  $4\frac{5}{8}$  in.

### (2473) *Gen. DRACO*, Linne—Vide Capt. l. c, p.

### (2474) *DRACO DUSSUMIERII*—Dum. and Bibr.

Anterior and posterior angles of each orbit edged by a small pointed horn; grey, wings marked black and red.

This very beautiful little lizard is only found in the forests of the West Coast, or rather in the neighbourhood of the forests, for it frequents cocoa-nut and betel-nut plantations: in their vicinity chiefly, not living, it is alleged, in the woods themselves, nor in the gardens at any distance from the forest. It is tolerably common in all Malabar, Cochin and Travancore, but not known farther North than Malabar, being either unknown or very rare in Canara.



The colour of the body is a delicate grey with some darker markings, which the animal occasionally renders very distinct, at other times obscures entirely. It sometime also changes its whole hue to a dark blackish grey. The ground colour of the wings is red marbled with black and edged with yellow. The small dewlap is pale yellow marbled with green at the base. This I may remark is never extended forwards to the extent usually seen in stuffed specimens, being merely brought forward now and then to the edge of the chin, and in a flat state not distended with air. The two lateral appendages of the head, also, are merely slightly raised now and then, and never distended in the manner seen in dried specimens.

(2475) *Gen. AGAMA*, Daudin.

Head short, triangular; nostrils near the muzzle: 2—5 incisive teeth in upper jaw; a longitudinal fold beneath the throat and another across the neck. Tail compressed, conic. Anal pores.

(2476) *AGAMA DORSALIS*—Gray.

Nostrils small, somewhat tubular; occipital plate very small, simple; a small group of spines behind the ear, which is large. Dorsal crest almost wanting; scales above small, equal, keeled, those beneath smooth.

This large rock lizard is only partially distributed in Southern India, and is only found at some elevation above the sea. It is most abundant in Mysore, and especially so in the neighbourhood of Bangalore, where it may be seen on every bare rock about. It is also not uncommon on the edges of the Nilgherries up to the height of nearly 6000 feet. Its normal colour and that of the female at all times is a dusky grey with dark markings. The male can assume a very bright livery, viz. fine vermilion red above, with a streak through the eye; under surface, limbs and tail black: occasionally the red is exchanged for yellow. It frequents bare rocks only, and retreats into holes and clefts on the approach of danger.

Length of a fine male 16 inches, of which the tail is  $10\frac{1}{2}$ . [The Society possesses a specimen from Pind Dadun Khan, presented by W. Theobald, Esq. Jur.—*Cur. As. Soc.*]

#### FAM VARANIDÆ.

(2477) *Gen. VARANUS*—Vide Cantor l. c. p. 633.

(2478) *VARANUS DRACÆNA* L. (*Query Linne.*)  
*Tupin. Bangalensis*; Daud.

*V. guttatus*) Merr.

*V. argus*, Merr.

*Tup. cepedianus*, Daud. and Kuhl.

*V. punctatus*, Merr. and Less.

*Mon. gemmatus*, Guer. Ic. R. A.

*V. Bibroni*, Blyth. *J. A. S.* 1842, p. 866.

Nostril situate exactly between the eye and

muzzle. Tail compressed with a strongly dentated ridge.

This species of Monitor appears generally spread throughout the whole of India. It is chiefly nocturnal in its habits and frequents jungly places. It is by no means confined to the neighbourhood of water, though perhaps it prefers such a locality. It defends itself most vigorously by striking with its tail. It can climb well both trees and walls, and it is popularly believed, that thieves make use of it to effect an entrance into a building or over a wall by allowing the guana to get hold by its fore-claws of the window sill or wall and pulling themselves up by it. It is eaten by the natives, who consider it highly nourishing and aphrodisiac, and many Europeans use it for soup, imagining it allied to the West Indian Guana. It can always be procured in the Madras market.

Length of one 44 inches, of which the tail is 25. [The largest specimen in the Society's Museum measures 52 in.; and our largest of *Hydrosaurus salvator*, (Laur.). 78 in., or exactly the same as that of *H. giganteus*, Gray, in the British Museum. *Empagusia flavescens*, Gray, our third common Monitor of Lower Bengal, we have not known to exceed 3 ft. in length. The Society has lately received a large specimen of *Hydrosaurus salvator* from Ceylon; and *Empagusia flavescens* likewise inhabits the Indus territories.—*Cur. As. Soc.*]

#### FAM. LACERTIDÆ.

(2479) *Gen. CALOSAURA*—Dum. and Bibr.

Maxillary teeth simple and tricuspid. Nostril placed on the *canthus rostralis*. A small fold of skin in front of the shoulder; abdominal scutæ quadrilateral, smooth placed in longitudinal bands; 5 fingers and 5 toes; tail square at the root, round for the rest of its extent.

(2480) *CALOSAURA LESCHENAULTII*, Dum. and Bibr.

Dorsal scales rhomboidal, keeled; six rows of longitudinal scales on the abdomen.

Reddish brown above, pale yellow beneath, sides dark brown with 2 pale yellow bands, tail red.

Length of one  $5\frac{2}{10}$ th in., of which the tail is  $3\frac{1}{2}$ .

This pretty little ground lizard is somewhat locally distributed. I have seen it in the Salem and Coimbatore districts only, especially near the banks of the Cavery. It frequents bushy ground hedges of Euphorbia and clumps of Cactus, under which it rapidly takes shelter, as also among rocks. [The Society's Museum contains examples of what we take to be this species from Pind Dadun Khan, in the Punjab Salt Range; and formerly possessed the same from Afghanistan.—*Cur. As. Soc.*]

(2481) *Gen. ACANTHODACTYLUS*, Fitz.

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One naso-rostral plate, ventral lamellæ quadrilateral, smooth. Fingers and toes compressed, toothed.

(2482) *ACANTHODACTYLUS NILGHERRENSIS*—n. s.

Anterior edge of ear toothed scaly, collar transverse, scales of back somewhat larger behind than in front, an occipital plate.

This lizard, apparently belonging to a genus new to India, was obtained by W. Elliot, Esq. on the Nilgherries near Coonoor. I have not myself been fortunate enough to observe it, and know nothing of its haunts. Its colours in spirit are of a pale pearl grey with a row of black spots on its back, another row on its sides somewhat larger and white edged black.

Length of one  $5\frac{1}{2}$  inches, of which the tail is 3. [A specimen with tail imperfect was long ago presented by Mr. Jerdon to the Society's Museum—*Cur. As. Soc.*]

## FAM. SCINCIDÆ.

(2483) *Gen. MOCOA*, Gray.

●(2484) *MOCOA BILINEATA*, Gray, Ann. Nat. Hist. Dec. 1846, p. 430.

Fronti-parietal plates two separate; ears round, moderate, with two very indistinct minute scales in front; the drum sunken; scales 6 or 8 rowed, thin, smooth: above shining olive, whitish beneath, a dark broad line on each side from nostril to end of tail. In the young and half grown animal, the tail is of a beautiful smalt or violent colour.

Length of one  $5\frac{1}{2}$  inches, of which the tail is  $3\frac{1}{2}$ . [Remarkable for its *Riopa*-like proportions, and great length of tail; also for having four large acutely triangular præ-anal scales, with the points converging posteriorly.—*Cur. As. Soc.*]

I have only found this Scink under stones on the summit of the Nilgherries. It appears very similar to *Lygosoma Dussumerii* of Dumeril and Bibron.

(2485) *Gen. RIOPA*, Gray.

(2486) *RIOPA ALBOPUNCTATA*, Gray, l. c.

Pale olive brown, yellowish white beneath, sides of one 4 inches, of which the tail is not quite 2.

This certainly looks very like the *Tiliqua pulchra* figured in Gray and Hardwicke's Illust. of Indian Zoology. I have found it in the Nellore district, where it is rare. [The Society has lately received it from Mergui.—*Cur. As. Soc.*]

(2487) *RIOPA PUNCTATA* (L.) Gray.

Length of one 9 inches, of which the tail is  $4\frac{3}{4}$ .

I have found this lizard both on the Eastern and Western Coasts of India under stones, or in the ground.

(2488) *RIOPA HARDWICKII*, Gray.

Very similar to the last, but with a longer and more pointed muzzle, and brighter colours, the stripes on the back being generally more distinct, and the tail, in the young, bright vermilion red. I have only found it in the Carnatic, where it is not very rare.

Length of one 9 inches, of which the tail is 5. It is found concealed in dark places, under logs of wood, stones, &c. [Hab. also Ceylon.—*Cur. As. Soc.*]

(2489) *Gen. TILQUA*.

(2490) *TILQUA RUFESCENS*, Merr.

*T. carinata*, Gray.

*Euprepes Sebae*, C. and B.

This is the most common Scink in the country, being universally dispersed throughout India, hiding itself under leaves, rubbish, stones, in dark rooms, &c. It runs with some rapidity, and is very active. Those I have seen in the Carnatic have the two yellow bands on the sides well developed, and appear to belong to the varieties A. and B. of Dumeril and Bibron, whilst on the Malabar Coast the variety D. and E. only is to be seen. [Those of Bengal are constantly banded, so far as we have seen; and the sanguine red colour of the lower band seems to denote the breeding season. In a very large specimen taken lately in my own garden (length 12 in., of which the tail measures  $7\frac{1}{2}$  in.), the bands are nearly obsolete.—*Cur. As. Soc.*]

Length of one 9 inches, of which the tail is  $5\frac{1}{2}$ .

(2491) *TILQUA TRIVITTATA*, Gray.—Gray and Hardwicke's Ill. Ind. Zool.

Very similar to the last, but with the head shorter and more triangular, scales of the back broader, and three stripes along the back.

Length of one 8 inches. of which the tail is  $4\frac{3}{4}$ .

Mr. Gray, in his description of the *Euprepes trilineata*, mentions that his *Trivittata* is yet unknown in Europe. I possess two specimens, which correspond exactly with the figure in Hardwicke's 'Illustrations.' I procured my specimens at Jalnah, where it is the common species.

(2492) *TILQUA RUBRIVENTRIS*, Gray.—Gray and Hardw. Ill. Ind. Zool.

Olive brown above, beneath yellowish, usually red on the throat only, at times the whole abdomen red, sides white-spotted on a dark ground, row of black spots on centre of back, and some other smaller ones on each side; three keeled scales.

Length of one  $6\frac{3}{4}$  inches, of which the tail is  $3\frac{5}{10}$ ths.

This pretty Scink is tolerably common in wooded places, lurking about chiefly among fallen leaves. It is more abundant on the West Coast



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than in the Carnatic. The red colour of the abdomen is, I think, seasonal, and confined to the males. Mr. Gray mentions that, before my specimens were sent home, it was only known by the figure in Hardwick. [The Society has a small specimen from Assam which may be *T. MULTICARINATA*, (Kuhl?), apud Gray. Scales distinctly seven-keeled. Colour greyish olive-green above, with dark spots on the hinder part of the body and base of tail. Lateral band, commencing from the ears, dark olive, with three narrow whitish stripes along the basal half of the tail, which are broken into spots on the sides of the body. Terminal half of tail whitish. Below also white, with obscure dark striæ.

(2493) *Gen. EUPREPES*.

(2494) *EUPREPES TRILINEATA*—Gray, l. c.

Ears with two elongated scales in front, scales five-keeled, above pale yellow brown, beneath yellowish white, 3 white stripes edged with black on anterior half of the back, legs reddish.

Length of one  $7\frac{2}{10}$  inches, of which the tail is nearly 4.

This well marked species is locally distributed. I have found it only in sandy ground, near the sea in the Carnatic, concealing itself in holes and fissures, and under shrubs.

I procured, on one occasion, a specimen of a small Scink in the forests of Malabar, which appeared distinct from any of the previous ones. It was uniform dark above and whitish beneath, body compressed, and scales two-keeled. Unfortunately, however, it was destroyed before I made a full description of it. I may here mention that *Goniodyctylus indicus*, *Calotes viridis*, *Salea Jerdoni*, *Mocia bilineata*, *Riopa albopunctata*, and *Euprepes trilineata*, were described by Mr. Gray from specimens sent home by me to the British Museum.

*Reptiles of the Peninsula of India* By T. C. JERDON, Esq., Madras Medical Service. Beng. As. Soc. Journ. No. 6 of 1853, p. 522 to p. 534.

The following is merely a brief and imperfect resume of the serpents and frogs of S. India, drawn up from my drawings, with a few rough notes attached to them; as circumstances have prevented my giving a more full account at this time; but a detailed account will be drawn up, as soon as I have again access to my collection.

### OPHIDIA.

#### VENOMOUS SERPENTS.

##### FAM. VIPERIDÆ.

##### SUB-FAM. BUNGARINÆ.

##### TERRESTRIAL.

(2495) *ELAPS MELANURUS*, (Shaw)—Russell l, pl. 8.

I never procured but one specimen of this lit-

tle snake. It was at Jalnah and about 14 inches long. It was red beneath the tail and was very bold. Scutæ 234. Scutellæ 28. 13 rows of scales. Common in Burmah.—*Cur. As. Soc.*

(2496) *ELAPS MALABARICUS*—n. s.

Head black with transverse bands, body brown above with black markings, bright red beneath. Scutæ 246. Scutellæ 38. 13 rows of scales. Tail exceeds  $\frac{1}{10}$ th of total length.

I have found this little snake in forest in Malabar, once or twice during the monsoon. The red colour of the abdomen fades in spirits.

(2497) *BUNGARUS CANDIDUS*—L., Russell l, pl. 1.

*B. semi-fasciatus*, Schl.

"Yenna vyrien" of the Tamools.

Up to 3 feet in length. Is very common all over Southern India, and is said to be fatal. Scutæ 217. Scutellæ 39.

This snake may be distinguished from one or two harmless species that much resemble it in colour, by the subcaudal scutellæ being in one row, not double.

(2498) *BUNGARUS FASCIATUS*—Russell l, pl. 3. Golden banded bungarum.

I have only seen specimens of this handsome snake in the Northern Circars at Ganjam, where it is not very common. It is said to be very deadly.

##### SUB-FAM. NAJINÆ—Bon.

(2499) *HAMADRYAS OPHIOPHAGUS*—Cantor?

*Naia vittata*—Elliot?

*Sankarachur* and *Shakha-muti*, Beng.

I once had a magnificent snake of this genus sent me which had been killed in forest in the Wynaad. It was  $12\frac{1}{2}$  feet long. Scutæ 225, Sub-caudal do. 12. Scutellæ 64.

I am inclined to think that it may be a different species from the Bengal serpent, for it was of an uniform dark olive colour above, without any appearance of bands. The specimen was unfortunately destroyed. One, 9 ft. long, which I procured about 20 miles S. of Calcutta, and now in the Society's Museum, is banded throughout.—*Cur. As. Soc.*

(2500) *NAIA LUTESCENS*—Russ. l, pl. 6. Cobra.

Naga pambu, or Nella pambu—Tam.

But too common all over India.

##### SUB-FAM. VIPERINÆ—Bon.

(2501) *TRIGONOCEPHALUS NEPA*—Laur.

*Cophias hypnale*—Merrem.

Scutæ 142. Scutellæ 39. 17 rows of scales not uncommon in forests in Malabar. I have not seen it longer than 16 or 17 inches.

(2502) *TRIGONOCEPHALUS ELLIOTI*—n. s.

Form massive; 23 rows of scales on the body; Scutæ 151, Scutellæ 43. Olive-green above;

## REPTILES OF THE

—pearl-white beneath; poison-fangs small; head covered with plates. Up to 2 feet and upwards long.

I have only procured this on the Neelgherries towards the lower portion of the plateau. Dr. Cantor tells me that "the shields of the crown of the head resemble those of *Trig. blanchoffi*, Schlegel."

(2503) *TRIGONOCEPHALUS (COPHIAS) VIRIDIS*—Merrem. Russ. 1, pl. 9.

21 rows of scales, 154 Scutæ, 60 Scutellæ. Rare, I have only got it from the Eastern Ghats.

(2504) *TRIGONOCEPHALUS (COPHIAS) MALABARICUS*—n. s.?

Very closely allied to *T. nigromarginatus*. Has 21 rows of smooth scales. Scutæ 145 to 149. Scutellæ 48 to 53. Green above, with brown transverse and zigzag markings. Up to 2 feet long nearly. Not uncommon in all the forests of the West Coast.

(2505) *TRIGONOCEPHALUS (COPHIAS) NEELGHERRIENSIS*—n. s.

• Of small size, dark brown with black markings. 23 rows of carinated scales. Scutæ 142. Scutellæ 36. Not uncommon in woods on the Neelgherries.

(2506) *TRIGONOCEPHALUS (COPHIAS) WARDII*—n. s.?

Has 21 rows of carinated scales. Scutæ 154. Scutellæ 51. Greenish colour, with purplish-brown diamond spots on back and sides; 12 to 14 inches long. The scales of the head resemble those of *T. sumatranus*, Raffles, according to Cantor (*in literis*).

(2507) *VIPERA RUSSELLII*—Gray. Russell 1, pl. 7.

"Kunnadi vyrien" of Tamools.

This well known and justly dreaded snake grows to a large size. I am strongly inclined to believe that the far famed *Cobra monil*, or *Cobra manilla* of some, is merely the young of this species. The old orthography is *monil*, which simply means a chain or necklace, and whoever looks at the markings of this snake, especially of the young one, must be struck with the resemblance thereof to a necklace. I need hardly remind the reader that both *Cobra capella* and *Cobra monil* are Portuguese names, and I have little doubt, that the latter name was given to our present species by the Portuguese. It has however been forgotten as applied to this viper, and may now be considered a fable; for every one you meet is able, on his own showing, to point you out the *real Cobra monil* as quite distinct, and what is more remarkable, no two observers describe it alike, they only agree in its being a very deadly snake. I may here add that the *carpet snake*, another household word in the Madras army, appears to me to be equally fabulous, as I have not been able to identify it among the

venomous snakes, several prettily marked innocent species having been, at different times pointed out to me as the carpet snake. Generally, I think, the little harmless *LYCODON AULICUS* (as indeed mentioned afterwards by Mr. Jerdon); and this, perhaps, from its habit of entering houses as much as from its markings.—*Cur. As. Soc.*

(2508) *VIPERA ECHIS*—Schlegel. *V. noratta*—Shaw. Russell 1, pl. 2.

"Kutta vyrien" of the Tamools.

This little snake is very common in the Carnatic. I do not think its bite would prove fatal to man. I have known a dog bitten by one to recover.

The above are all the venomous land snakes I have yet met with in Southern India. Of these the only ones at all common are the Cobra, the Chain Viper (*Vipera Russellii*), the *Bungarus candidus*, and the little *Vipera echis*. Most of the others are peculiar to the forests of India. The *Trigonocephali* are not usually fatal. I have known several cases of bites by *Trigonocephalus malabaricus*, and *Trig. nepa*; and none proved fatal. Great pain is experienced, and swelling usually follows, but the patient gradually recovers. I myself was bitten in the fore finger by the *Trigonocephalus neelgherriensis*; I applied a ligature round the finger, and sucked the wound vigorously. In a minute or so the skin round the bite blackened, and in a minute or two more a perfectly circular bit of the skin came off in my mouth. I set off running immediately I was bitten, and felt no further ill effects. See Cantor's remarks on the bite of *Trig. Sumatranus*, Journ. As. Soc., Calcutta, XVI, 1044-6; also Blyth, *ibid.* XX, 524.

### PELAGIC.

#### FAM. HYDRIDÆ.—Bon.

(2509) *HYDROPHIS COLUBRINA*—Schlegel var. ?—In. s.

I possess what is apparently a variety of this species of sea-snake. It differs from the finished drawing of the species in Cuvier's *Regne Animal* (Edit. des Eleves), in the black markings meeting on the back and abdomen, thus forming a series of light-colored oval spots on the sides; the abdominal scutæ commence nearer the mouth, having only 3 or 4 series of small scales between them and the elongated mentals; the scutæ are above 300 in number, and the rows of scales are from 35 to 45—whilst in *H. colubrina* the scutæ are only 246—and the rows of scales 25. My only specimen is a young one procured at Madras.

(2510) *HYDRUS SCHISTOSUS*, Daud.—Russell 2, pl. 10.

Up to 4 feet long nearly. Very common at Madras.



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(2511) *HYDRUS PELAMIDOIDES*, Schlegel.  
Not common at Madras.

• (2512) *HYDRUS BICOLOR*, Schneider—Russell 1, pl. 41. Rare at Madras.

(2513) *HYDRUS STRIATUS* Lacép.—Russell 2, pl. 9? Not rare at Madras, up to 6 feet in length.

(2514) *HYDRUS NIGROCINCTUS*, Daudin.—Russell 2, pl. 6. Common at Madras.

(2515) *HYDRUS CANTORI*, n. s.—II. *NIGROCINCTUS*, var.—Cantor, J. A. S. C. XVI, 1050.

Dr. Cantor described this as a variety of the last, in his valuable Catalogue of Malay Reptiles.

I forwarded him a specimen in 1848, and he remarked as follows on it. "From the examination of this specimen, the second I have seen, I am induced to believe it a distinct species, and not a variety of *nigrocinctus*." It differs from this last species in the more robust make, larger scales, there being only 21 rows on the body, and larger abdominal scales especially near the head; also in the shorter triangular head, &c. &c.

I never saw it at Madras, but it is not rare at Tellicherry on the Malabar Coast. Up to 2 feet in length.

(2516) *HYDRUS GRACILIS*, Shaw—Russell 2, pls 7 and 8.

The number of rows of scales varies from 26 to 35 on the neck, and from 44 to 51 on the trunk. Scutæ 350 to 450. Scutellæ 50 to 60. Very common at Madras.

Very remarkable for the small circumference of head and neck compared to that of the body.

Very common at Madras. Up to 4 feet long.

All the above sea-snakes are venomous, and their bite to be dreaded.

### FAM. BOIDÆ—Bon.

(2517) *ACROCHORDUS GRANULATUS*, (Schneider)—A. *FASCIATUS*, Shaw.

Rare—Found sometimes in back-waters.

(2518) *PYTHON MOLURUS*, (L.)

P. *Trivittatus*, Schl.—Russell 1, pl. 22.

Boa, or Rock snake, of Europeans in Madras.

Found all over the country. I have not seen a specimen longer than 19 feet. This was killed in Travancore, after having swallowed a doe spotted deer.

(2519) *BOA (GONGYLOPHIS) CONICA*, Schl.—Russell 1, pl. 4.

Not rare in the Carnatic and Malabar. It is considered venomous by some of the natives. Has a very malignant aspect. Up to 18 inches long and upwards.

(2520) *XENOPELTIS? TRIVIRGATUS*...n. s.

Brown above, with a triple series of black marks—beneath white, black-banded; of a shin-

ing nacreous lustre throughout. Scutæ 137. Scutellæ 29. 13 rows of scales. I have only found this on the Neelgherries.

(2521) *TORTRIX ERYX*, Schlegel—var.?

Two headed snake of many:—common. Scutæ 205. Scutellæ 36.

• (2522) *CYLINDROPHIS MACULATUS?*? This, Dr. Kelaart has sent to the Society's Museum from Ceylon.—*Cur. As. Soc.*

(2523) *CYLINDROPHIS CURTICEPS*—n. s.?

Differs from the last in its shorter, more triangular head, &c. &c.

(2524) *CYLINDROPHIS MACROSCELIS*—n. s.?

Differs from both in the much larger scales. These last 3 small species are not very common. They are sometimes found on the surface of the ground in rainy weather, but are generally dug out of the earth. They are called earth-snakes by the natives.

### FAM. TYPHLOPHIDÆ.

(2525) *PILIDION? MONTANUM*—n. s.?

Above bluish-black, yellow on the sides, with a black spot on each of the 3 lower scales; abdomen banded black and white. Scutæ? Scutellæ 15. 15 rows of scales. 15 inches long. Found only on the Neelgherries.

(2526) *UROPELTIS CEYLONICUS*.

*Uropeltis affinis*—n. s.

Differs from the last in its smaller scales, in the abdominal scutæ being larger, and commencing sooner.

They are both rare. I procured them on the Western Coast.

(2527) *ONYCHOCEPHALUS ACUTUS*—Dum. et Bibr.

I possess one example of this curious reptile, which I procured in the Carnatic at Nellore. Dr. Cantor remarks, "Described from an unique specimen, habitat unknown."

(2528) *TYPHLOPS BRAMINUS*, (Daud.)—Russell 1, pl. 43.

This group, the *ARGYROPHIS* of Mr. Gray, requires to be studied, as several species appear at present to be confounded. The Society's Museum has lately received *TYPHLOPS RUSSELLII*, Gray, from Chye-basa.—*Cur. As. Soc.*

Common under stones in the rainy season, usually called earthworm.

(2529) *CALAMARIA SAGITTARIA*—Cantor.

A specimen sent to Dr. Cantor was so named by him; it had only 170 scuta and 70 cutella. It is not rare in forests in Malabar.

(2530) *CORONELLA TENIOLATA*—Russell 1, pl. 19?

15 rows of smooth scales; Scutæ 185. Scutellæ 41.

This species is referred to *Tropidonotus stola-*

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by Cantor, but a snake that I possess and which answers tolerably well to Russell's description and figure appears to be a true *Coronella*. It is common at Madras.

(2531) *XENODON VENUSTUM*, n. s. ? [*X. purpurascens*, Schlegel].

Above olive-brown with a triple series of irregular black spots, the central one edged with pale yellow; some transverse marks on head and neck. Has 17 rows of scales. Scutæ 142. Scutellæ 31.

Rare—found on the West Coast only; 1 foot long.

(2532) *XENODON DUBIUM*—n. s. ?

Of the pale earthy brown colour, lighter on the side; a series of darker marks, irregular in shape, and edged with black. Scutæ 181. Scutellæ 41. Has 15 rows of scales. Rare—I procured it in N. Canara.

(2533) *LYCODON RUSSELLII*—Russell 1, pl. 35.

Scutæ 193. Scutellæ 47. 17 rows of smooth scales. Rather common in Southern India.

(2534) *LYCODON AULICUS*, (L.)—Russell 1, pls. 16 and 26.

Has 17 rows of scales. My specimens have only from 165 to 174 scutæ and from 54 to 61 scutellæ, which correspond with Russell's nearly, viz. from 171 to 174 and 40 to 41, whilst Cantor gives from 208 to 257 and from 57 to 91. One specimen which resembles in colour Cantor's var. B. (*Lycodon capucinus*, Boie,) does not differ in number of the scutæ, &c. Very common all over the country, often called Carpet Snake and considered dangerous, though of course harmless.

(2535) *LYCODON PLATURINUS*, (Shaw.)

Scutæ 183. Scutella 76. Rare in Southern India—17 rows of scales.

(2536) *LYCODON NYMPHA*—Russell 1, pls. 36 and 37. bad figure.

13 rows of scales; Scutæ 234. Scutellæ 87—not rare at Madras.

(2537) *LYCODON ASSIMILIS*—n. s.

Very similar in colour to the two last species, viz. black with white bands. It differs in having 23 rows of scales. Has 190 scutæ and 60 scutellæ. I have mislaid the locality of this species.

(2538) *COLUBER BLUMENBACHII*, Schleg.—Russ. 1. pl. 34.

*Dhamin*, H., *Sarray pambou*, Tam.

Perhaps the most common snake in India, grows to a large size, 7 feet and upwards; frequents chiefly marshy land, paddy-fields, &c. Scutæ 200, Scutellæ 125—17 rows of scales.

(2539) *COLUBER FASCIOLATUS*, Shaw—Russell 1, pl. 21.

Scutæ 200. Scutellæ 58. Not uncommon at

Madras and elsewhere in the Carnatic. I have seen it nearly 3 feet long.

(2540) *COLUBER PICTUS*, Daud. Russell 1, pl. 29.

Scutæ 202. Scutellæ 91—Russ.

## ARBOREAL.

(2541) *DIPSAS TRIGONATA*—Russell 1, pl. 15.

*Tati kattaday*, Tel.; *Peri Surutay*, Tam.

Scuta 335. Scutella 83. Common in the Carnatic.

(2542) *DIPSAS CYNODON* ?

My specimens correspond very well with the description in Schlegel. Scutæ 240. Scutellæ 110. Rows of scales 21.

Up to — feet and upwards in length. I have only found this snake in forests on the West Coast.

(2543) *LEPTOPHIS PICTUS*, (Gmel.)—Russ. 1, pl.

*Kumberi mukar*, T.; *Chettooriki pambu*, Tam.

176 scutæ and 140 scutellæ—15 rows of scales. Very common in all parts of the country.

(2544) *LEPTOPHIS* ? *BELLII* ?—n. s.

Scutæ 173. Scutellæ 64. Green above, with dark line on the sides bordered on each side by a pale stripe—17 rows of scales. This much resembles the drawing of *Ahaetula Bellii* in Gray and Hardwicke. I procured one specimen in a grassy plain at Jalnah. It had killed and was swallowing a small *Vipera echis*.

(2545) *LEPTOPHIS ORNATUS*, Shaw.—Russ. 2, pl. 2.

Scutæ 209. Scutellæ 129—17 rows of scales. I have only procured this very handsome snake lately in Malabar.

(2546) *LEPTOPHIS* ? *NILAGIRICUS* ?—n. s.

Green above, yellow beneath. Scutæ 140. Scutellæ 73—13 rows of scales. Very common on the grassy hills of the Neelgherries.

(2547) *LEPTOPHIS* ? *CANARENSIS* ?

Green above, yellowish beneath with a streak on the sides. Scutæ 140. Scutellæ 57—15 rows of scales. Procured in North Canara.

Perhaps these two last belong more properly to *Dryinus*. Of the last Dr. Cantor remarks "Apparently *Dryinus Prasinus*, var. A."—the number of the scutæ, &c. however differs very materially.

(2548) *DRYINUS NASUTUS*.—Russell, 1. pl. 12

Green whip-snake. Scutæ 180; Scutellæ 158. Common all over the country. I lately saw one that had swallowed a Parroquet and became gorged.

(2549) *HERPETODRYAS MALABARICUS*,—n. s.

Olive brown with a dark streak along the sides, most conspicuous on the posterior portion of the body; a series of white spots on the anterior



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portion of the body, edged with black. Scutæ 222; Scutellæ 91--25 rows of scales. It is possible that this may be *H. helena*, as I possess a young one in which the markings differ somewhat, and much resemble those on Russell's figure, which is evidently a very bad one. I have procured it in Malabar where it is not very rare. [COLUBER HELENA is quite distinct.—*Cur. As. Soc.*].

(2550) *TROPIDONOTUS STOLATUS*, (L.)—Russell 1, pl. 10 and 11.

Scutæ 146; Scutellæ 61--19 rows of scales. Seldom exceeds 18 inches in length; one of the most common snakes in India.

(2551) *TROPIDONOTUS SCHISTOSUS*, (Daud.)—Russell 2, pl. 4. Scutæ 140; Scutellæ 85--17 rows of scales.

(2552) *TROPIDONOTUS PLUMBICOLOR*, Cantor. The colour of the living snake is leek green. Scutæ (in a young one) 143; Scutellæ 36?—21 rows of scales.

Found in the Wynaad [also in Bundelkund, and about Midnapore].

(2553) *TROPIDONOTUS MONTICOLUS*,—n. s. Green, with a series of dark spots on the trunk, one on the centre of back and another on each side, the one on the right somewhat in front, the left one posterior, some white marks on the head; Scutæ 132; Scutellæ 85--19 rows of scales; eyes large; 3 feet and upwards in length. Common in the Wynaad, (2 anterior frontals, 3 posterior ditto, lowest scales rhombic).

(2554) *TROPIDONOTUS PISCATOR*.—Russell, 23 and 33.

19 rows of scales; 139; Scutæ Scutellæ 83. Found in wells and tanks. Very common.

(2555) *HOMALOPSIS RHYNCHOPS*, (Schneider).—Russell 1, pl. 17

Scutæ 146; Scutellæ 65. Common in estuaries.

(2556) *HOMALOPSIS ENHYDRIS*, (Schneider).—Russell 1, pl. 30.

Scutæ 150; Scutellæ 58. Found in the same localities as the last.

## BATRACHIDÆ.

(2557) *CÆCILIA OXYURA*,—Dum and Bibr. Found on the West Coast, but rare.

(2558) *EPICRIUM GLUTINOSUM*, (L.).

Found in Malabar. 2 cirri quite distinct [Probably a distinct species from *E. GLUTINOSUM* of Ceylon, as sent by Dr. Kelaart. The latter has a strongly marked pale lateral band, and the *cirri* are less developed than they are represented to be in Mr. Jerdon's drawing. Dr. Kelaart, however, obtained a second species, and which may be that noticed by Mr. Jerdon; and either may be identical with the *Epicrium* from Assam and from Pinang—*Cur. As. Soc.*].

(2559) *RANA TIGRINA*. Bull frog. Found all over India.

(2560) *RANA CUTIPORA*,—Dum and Bibr.

In tanks in the Carnatic. Of a beautiful grass green colour, with or without a central yellow stripe on the back.

(2561) *RANA LESCHENAULTII*, Dum. and Bibr. The common frog of India.

(2562) *RANA CRASSA*,—n. s.

Of a thick clumsy form, feet webbed to the extremity of the toes; limbs shorter than in *R. Leschenaultii*, head wider, greenish above with dusky markings. Length  $3\frac{8}{10}$ ths; hind leg  $5\frac{1}{2}$ . Rare—Found in a few tanks in the Carnatic.

(2563) *RANA MALABARICA*.

Found only the West Coast, and chiefly during the monsoon when it enters houses, and makes a great gobbling, so much like a turkey that some people call it the 'Turkey frog.'

(2564) *RANA FLAVESCENS*,—n. s.

Of a buff colour on the back; yellow on the sides; limbs banded; feet webbed nearly to the extremities. Length of one  $3\frac{2}{10}$ ths; hind leg  $5\frac{1}{2}$ . Of slender make, pointed muzzle.

Found frequenting mountain streams in the forests only.

(2565) *RANA CURTIPES*,—n. s.

Head very wide; muzzle obtuse; limbs rather short; feet webbed to the ends of the toes, except the centre one. Head and back above bright buff; sides deep maroon; legs dark purple with a few white spots; abdomen white mottled. Length of one  $2\frac{9}{10}$ ths; hind leg  $4\frac{1}{10}$ th.

Found in forest only. Has a very peculiar, rather pleasing call. Chiefly seen during the monsoon.

(2566) *RANA AGRICOLA*,—n. s.

Feet not webbed quite to the extremity. Of a greenish colour, mottled with darker. Length of one  $2\frac{1}{10}$ th; hind leg  $3\frac{3}{10}$ ths; foot 1.

Found in inundated paddy-fields and meadows.

(2567) *RANA NILAGIRICA*,...n. s.

Very much allied to the last, differs in its much longer limbs. Length 2 inches; hind leg  $3\frac{8}{10}$ ths.

I have only seen this frog in marshes in the Wynaad and Neelgherries.

(2568) *POLYPEDATES LEUCOMYSTAX*.

'Chunam frog' of Europeans. Very common all over India.

(2569) *POLYPEDATES VARIABILIS*,—n. s.

Green frog of the Neelgherries.

Green, sometimes unspotted, at other times with gold spots or blackish spots; at times golden yellow with brown spots; at other times brown with darker spots.

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Length  $2\frac{1}{2}$  inches; hind leg 4; foot  $1\frac{2}{10}$ ths.  
Found in the Neelgherries in the banks of streams and in shrubs.

(2570) *IXALIS? GLANDULOSA*,—n. s.

A small tree frog, with very obtuse muzzle, feet slightly webbed; abdomen largely glandular, tympanum indistinct; green above, yellowish on the sides and limbs.

Length  $1\frac{2}{10}$ ths; hind leg  $\frac{7}{10}$ ths; foot  $\frac{9}{10}$ ths.

(2571) *RHACOPHORUS REINWARDTII*,—Dum. and Bibr.

Found in the Malabar Coast on trees, and in grass during the monsoon. Not very common.

(2572) *LIMNODYTES? PHYLLOPHILA*,—n. s.

A small frog, with the subdigital disks very slightly dilated; toes not quite completely webbed; tympanum small; reddish yellow, with the side of the face dark purple. Length  $1\frac{1}{2}$ ; hind leg  $1\frac{2}{10}$ ths; foot  $\frac{1}{2}$ ths.

Found in all the Western forests among decayed leaves.

(2573) *PHYLLOMEDUSA? TINNIENS*,—n. s.  
Tinkling frog of the Neelgherries.

Fingers opposable; feet webbed at base only; yellowish red, or sometimes blackish above; side of head dark; inner fingers yellow; length  $1\frac{1}{10}$ th; hind leg  $1\frac{3}{10}$ ths.

Found in grass and among bushes on the Neelgherries. Has a peculiar loud clear metallic tinkling call.

(2574) *PHYLLOMEDUSA? WYNAADENSIS*.

Somewhat allied to the last, differs in its larger limbs; larger tympanum, &c. Length about 1 inch. In this when the hind leg is drawn forwards, the end of the tibia reaches the muzzle; in the last it only reaches the tympanum; reddish brown above, limbs barred.

(2575) *POLYPEDATES? SAXICOLA*,—n. s.

A small frog with teeth, tympanum distinct, fingers webbed at the base; toes webbed to the extremities; pointed muzzle; dark olive green with dark marbling, and barred limbs. Length  $1\frac{1}{10}$ th; hind leg  $1\frac{3}{4}$ th; foot  $\frac{5}{10}$ ths; femur and tibia reach beyond the muzzle.

Found on rocks in shady mountain streams in Malabar and Wynaad.

(2576) *HYLÆDACTYLUS MONTANUS*,—n. s.

Mottled green and brown above. Length  $1\frac{7}{10}$ ths; hind leg 2; foot  $\frac{7}{10}$ ths. Hab. Mountain streams in Wynaad, rare. [A very nearly affined species, if not the same, inhabits Mergui].

(2577) *HYLÆDACTYLUS CARNATICUS*,—n. s.

Of small size; marbled green and brown; muzzle more acute than in the last species; length  $1\frac{3}{10}$ ths; hind leg  $1\frac{3}{10}$ ths; foot  $\frac{5}{10}$ ths. Found in the Carnatic during the monsoon, rare.

(2578) *BUFO SCABER*, Daudin.

Common toad of India. Very abundant.

(2579) *HYPERODON MARMORATUM*.

Found in the Carnatic during the monsoon.

(2580) *PYXICEPHALUS FODIENS*,—n. s.

Greenish marbled with brown. Length 2 inches; hind leg  $2\frac{3}{10}$ th, foot  $\frac{8}{10}$ ths. Found in the Carnatic, burrows in the ground for  $1\frac{1}{2}$  feet or so. [Hab. also Ceylon].

(2581) *PYXICEPHALUS PLUVIALIS*,—n. s.

Nearly allied to the last; differs in its shorter thicker form, and shorter limbs; light greenish fawn, with dark marbling. Length of one  $2\frac{2}{10}$ ths; hind leg  $2\frac{4}{10}$ ths; feet  $\frac{8}{10}$ ths. I only procured this during the monsoon in the Carnatic. It is very different in appearance, though with so few essential distinctions, and the natives give a distinct name to each.

(2582) *PYXICEPHALUS RUFESCENS*,—n. s.

Of a rufous colour above, whitish beneath; body rough and granulose; limbs barred.

Length  $1\frac{1}{2}$  inch; hind leg  $2\frac{1}{10}$ th; foot  $\frac{6}{10}$ ths. Not rare in gardens on the Malabar Coast.

(2583) *ENGYSTOMA ORNATUM*.

Some specimens of this very handsome frog were only once procured by Walter Elliot, Esq. on the Neelgherries.

Length  $1\frac{4}{10}$ ths inch, hind leg  $1\frac{6}{10}$ ths; foot  $\frac{11}{10}$ ths.

(2584) *ENGYSTOMA RUBRUM*,—n. s.

Indian red above; some black marks on the leg. Length  $1\frac{1}{10}$ ths inch; hind leg  $1\frac{5}{10}$ ths; foot  $\frac{5}{10}$ ths.

Found in the Carnatic near rivers, in sandy banks. Also Ceylon.—*Cur. As. Soc.*

(2585) *ENGYSTOMA MALABARICUM*,—n. s.

Isabella colour above, varied with dark angular markings; sides dark purplish; throat ditto; limbs barred. Length  $1\frac{1}{10}$ th; hind leg  $1\frac{6}{10}$ ths; foot  $\frac{5}{10}$ ths. Found in Malabar, under stones.

(2586) *ENGYSTOMA CARNATICUM*,—n. s.

Nearly allied to the last; differs in the shorter muzzle, shorter hind leg, &c. Length  $\frac{9}{10}$ ths of an inch; hind leg  $1\frac{1}{10}$ th; foot  $\frac{4}{10}$ ths. Found in the Carnatic during the monsoon.

*Reptiles, new or little known, By E. BLYTH, Beng. As. Soc. Journ. No. 7 of 1853 p. 639 to 655.*

(2587) *TESTUDO PHAYREI*, Blyth.

Great Burmese land Tortoise.

Carapax smooth, as in *T. RADIATA* and *T. ANGULATA*, but much flatter; oblong, subquadrate, its free marginal plates reverted and moderately serrate. Nuchal plate broader than long. Caudal plate double. Gular plates longer than broad, moderately notched; broader



than long, and deeply notched. Back unmarginate. Fore-limbs covered with very long and thick imbricated scales, much as in a Pangolin; the claws elongate, strong and thick: similar great elongate scales at the heel; and a group of five principal obtuse spines on either side of the tail, the medial of them remarkably strong and thick. Two or more smaller spines or thick elongate scales above the tail. Colour wholly black, or mingled more or less with buff-yellow. In the young, the scales are probably of the latter hue, with gradually increasing black centres. Limbs deep brown; some of the claws yellow in some specimens: the head and neck paler brown, strongly tinged with yellow. Our largest specimen is 20 in. long in a straight line, or  $22\frac{1}{2}$  in. measured over the curve of the carapax, from front of nuchal plate to middle of caudal notch: greatest breadth  $14\frac{1}{2}$  in. or  $20\frac{1}{2}$  in. following the curve, from one obtuse lateral angle to the other. Height  $1\frac{1}{2}$  in. Head to occiput  $4\frac{1}{2}$  in. The shell of this individual is wholly black, with merely a few slight indications of the ochreous yellow colouring: all the claws deep brown. Another, rather smaller, has the appearance of great age, with most of the plates of its carapax more or less completely united, so that the form of some cannot be traced. Colour irregularly mingled black and dull buff-yellow; the plastron chiefly black; and several of the claws are yellow wholly or in part. Hab. Arakan; Tenasserim Provinces. Specimens presented by Capt. Phayre.

(2588) *TESTUDO ELONGATA*, Blyth.

Small Burmese land Tortoise.

Carapax elongate, becoming more so and quite smooth in adults, wherein it approaches to a semi-cylindrical form; flattish, sub-even, the three medial vertebral plates lying almost in a plane, and the free marginals slightly reverted. Caudal broader than the last vertebral. Nuchal twice or thrice as long as broad, and even with the borders of the anterior marginals. Gulars not notched, or but very slightly so. Caudals divergent from base, and transversely elongate-triangular, broader than long, forming a slight lateral notch with the ventrals. Beak laterally notched or distinctly three-pointed. Scales of the limbs rather small, contrasting much with those of the preceding species. Colour of half grown specimen orange yellow, each plate having a large black centre, which mostly disappears with age, leaving a few more or less radiating black spots on those of the carapax, and often a black spot on only the large medial plates of the plastron. Head and limbs brown, much tinged with yellow. Length of an adult 13 in. in a straight line, by 8 in. across, or rather more towards the hinder part of the body. Height  $5\frac{1}{4}$  in. Head to occiput  $2\frac{3}{4}$  in. Hab. Arakan. Specimens presented by Capt. Phayre. According to Dr. Helfer, Tortoises abound in

the Tenasserim Provinces, and are much eaten by the Peguers and Karens, who train dogs to search for them.

(2589) *TESTUDO STELLATA*. In India proper and also in Ceylon, only one species of land Tortoise occurs, the *T. Stellata*, Schweigger, a figure and interesting notice of which are given by Capt. Hutton in *J. A. S.* VI, 689, under the supposition of its being *T. Geometrica*. The latter is a S. African species, very similar to *T. Stellata*, but having a distinct nuchal plate, which *T. Stellata* does not possess, and exhibiting certain other distinctions. Among some Tortoises, however, presented to the Society by Capt. Sherwill from S. Africa, are two small specimens of *Geometrica*, and one full grown example which can in no way be distinguished from the Indian *Stellata*. The latter does not inhabit Lower Bengal, and is rarely brought alive to Calcutta. One much more commonly brought here is the *T. Radiata*, Shaw, a larger species remarkable for its very hemispherical form, and which is said to be indigenous to Madagascar, in which case it is probably brought to India from the Mauritius. The very large specimen referred by Mr. Blyth, to *Stellata* (*v. actinodes*) in a note to p. 462 *ante*, he now thinks, after much consideration, to be distinct, and indicates as

(2590) *TESTUDO MEGALOPUS*, Blyth *n. s.*

Similar to *T. Stellata*, but attaining a much greater size, with proportionally much larger feet and claws. The colours duller and therefore less strongly contrasting, and the lines radiating from each boss of the carapax more numerous. Fore-feet with two large claw-like scales of equal size behind the palm, and no others approaching them in size. Claws of hind-feet fully twice as large as in adult *Stellata*. Length of carapax, measured in a straight line, 12 in. by  $7\frac{1}{2}$  in. in diameter breadth. Hab.—?

There are several living specimens about Calcutta, of the great Seychelle Tortoise, miscalled *T. Indica* by Gmelin, and under which Mr. Gray unites no fewer than seven of the supposed species admitted by M.M. Dumeril and Bibron. According to Dr. Schlegel, "The Indian Tortoise [so-called], probably indigenous to Madagascar and the neighbouring isles, has been acclimated in the Gallapagos Isles, in California, and on several other points on the western coast of South America:" but we have been assured, on good authority, that numerous specimens kept in gardens in the Mauritius, have all been brought from the Seychelle Islands in the first instance, that they are still commonly brought from those islands to the Mauritius, and thence we believe the few in India have been imported. It is most assuredly not an Indian reptile, nor have we heard of its ever propagating in this country. In the Mauritius he is informed that it is eaten. The largest he has

seen is in his own possession, alive, and measures 4 ft. 4 in. in length over the curve of the carapax, or 3 ft. 5 in. in a straight line; transversally 4 ft. 2 in. over the high arch of the carapax, or in a diameter line 2 ft. 2 in. in height, when not raised upon the legs, i.e. height of shell,  $20\frac{1}{2}$  in.; when walking, the shell is lifted fully 6 in. from the ground, if not more: circumference of hind-foot  $7\frac{1}{2}$  in. He continues:—A scientific friend, recently from Jamaica, assures him that this great Seychelle species is quite distinct from the great Gallapagos Tortoise, which has bred and multiplied in Jamaica and other W. Indian islands. Curious, that these gigantic land Tortoises (diminutive, however, in comparison with the extinct Indian *Colossocheilus*), should thus be indigenous to small oceanic groups of islands, in each case remarkable for the peculiarities of both their *fauna* and *flora*. We are reminded of the great wingless birds (Dodos and Solitaires) of the Mauritius, Bourbon, and Rodrigues; those also of N. Zealand and of Madagascar; the Megapodius of the Nicobars, and its congeners of other islands; the singular and quite recently extinct grey Parrot of Philip Islet near Norfolk island, with its sole congener in N. Zealand; the Owl-like nocturnal Cockatoo of N. Zealand, also close upon extirpation, &c. The majority, if not all, of these islands appearing to be remnants of what may be comparatively termed continents, each with its peculiar centre or centres of creation.

In all these supposed reliques of ancient lands, with the chief exception of Madagascar, mammalia are rare, and are chiefly or wholly *Cheiroptera*, *Rodentia*, and *Marsupialia*; the two former orders comprising the only placental mammalia of Australia; and one species of each of these placental orders being the only known indigenous mammals of N. Zealand, though a large Badger-like animal has lately been reported in the latter country, in all probability a marsupial. Madagascar is very remarkable for the extraordinary development of the quadrumanous group of Lemurs, among the higher placental mammalia; and has even a rodent Lemur in *Cheiromys*, as Australia has a rodent marsupial in *Phascalomys*. Its other placental mammals are mostly of peculiar genera, unknown even on the neighbouring continent of Africa; and no marsupial has been discovered there.

From Afghanistan Mr. Gray describes a *T. Horsfieldi*, which he suggests may be *T. Iberia*, Pallas, *Faun Casp.*, t. 5. The Society's Museum possesses a land Tortoise from that country, which however belongs to the genus *Homopus*, having but four claws to each foot. It may be thus described.

(2591) *HOMOPUS BURNESII*, Blyth. Carapax squarish, depressed, broadest posteriorly, where the free marginals are a little reverted and distinctly serrate. Anterior border straight, the

nuchal plate well developed. Caudal as broad as the last vertebral, and broader than the other vertebral plates. Nucleus of each lateral or discoidal plate near its inner or upper border. Gular plates longer than broad, the two forming a nearly equilateral triangle. Anals oblong, divergent, forming a rather deeply notched border. Scales of fore-limbs rather large, and those to the front mostly uniform in size. Claws elongate, or not worn down by attrition. Beak three-pointed. Colour yellow above, with black nuclei to the plates: those of the plastron black with yellow border. The head and limbs appear to have been yellowish. Length of carapax 6 in., by  $5\frac{1}{4}$  in., measuring straight. Height  $2\frac{7}{8}$  in. Head to occiput  $1\frac{1}{2}$  in. This large specimen was procured in Afghanistan by Sir. A. Burnes.

A very small *Homopus* in spirit, also from Afghanistan, is doubtless the young, though exhibiting some remarkable differences in the shape of the upper plates. In this the nuchal is roundish, or as broad as long; and all the vertebrals are about equally broad. Colour dull yellow throughout. Presented to the museum by Dr. Allan Webb.

(2592) *EMYS*. Of the numerous true *Terrapins* (*EMYS*) of the Gangetic rivers, only three species are common in the vicinity of Calcutta; and adults of all are rarely met with. These are—

(2593) *EMYS THURGII*, Gray, which attains to a much larger size than has hitherto been described, adults measuring 20 to 22 in. (straight) in length of carapax

(2594) *EMYS TECTUM*, Gray, the adults of which measure similarly 6 in.; and

(2595) *EMYS HAMILTONII*, Gray, the adults of which measure similarly  $5\frac{1}{2}$  in. The only other species we have yet met with from this vicinity is

(2596) *EMYS TENTORIA*, Gray, one young specimen only. This Mr. Gray describes from the Bombay Dukhun, where procured by Col. Sykes; and Sir Alexander Burnes obtained an adult from the Indus, which is now in the Society's museum. These two specimens differ in some respects from each other, also from Mr. Gray's description, and from Buchanan Hamilton's coloured figure, the two latter again presenting certain discrepancies one from the other. The species is nearly affined to *E. Tectum*, Bell, but at all ages has the median keels to the first three vertebral plates much less developed, and the form of the whole carapax is conspicuously flatter and broader. A peculiarity of both species consists in the peculiar decanter-shaped form of the fourth vertebral plate. Comparing the adult of *E. Tentoria* from the Indus (length of carapax, measured straight,  $6\frac{3}{4}$  in.) with an adult of *E. Tectum* from the Hughly (carapax, similarly measured, 6 in.), the first ver-



tebral plate is proportionally much broader in the former, pentagonal, narrower to the front, with a broad straight transverse base posteriorly, and the keel little developed; whereas the first vertebral plate of *E. Tectum* is pentagonal, broader to the front, with a rounded posterior base, and much more developed keel. In the former, the first vertebral is considerably larger and somewhat broader than the second, whereas in the latter it is sub-equal or even rather smaller than the second: in adult *E. Tentoria* the second vertebral plate is hexagonal but almost square, and rather broader than long, with the keel nearly obsolete: in *E. Tectum* somewhat pear-shaped, truncate to the front and narrowing and curving off posteriorly, with the keel strongly marked: the third vertebral plate of adult *Tentoria* is quadrangular, longer by half than broad, with the keel quite obsolete on the anterior half, and flat and but little raised posteriorly; in *E. Tectum* it is hexagonal, with the keel strongly developed and prolonged backward. A narrow black line is continued along the spinal ridge of *E. Tentoria*; whereas the middle of the ridge is broadly white in *E. Tectum*, bordered by a black line on either side. The plastron of *E. Tentoria* is blackish-brown, with a pale border to each plate; in *E. Tectum* pale with two or three distinct blackish patches on each plate. Comparing the young of the two species, the first vertebral plate forms a much broader pentagon in *E. Tentoria*, being equal in breadth to the second; in young *E. Tectum* the first vertebral plate is considerably narrower than the second: the second vertebral plate in young *Tentoria* forms a heptagon with the base posteriorly; in young *Tectum* a pentagon with rounded apex and anterior base: the third in young *Tentoria* is subquadrilateral, somewhat longer than broad, with the keel a little produced posteriorly; in young *Tectum* a pentagon with its base to the front, and the keel much broader and more prominent. Yet, notwithstanding these great differences of detail, and also of the colouring of the head, neck and limbs, the two species are very liable to be confounded on a superficial glance.

According to M.M. Dumeril and Bibron, the *E. Trijuga*, Schweigger, was obtained by M. Duvaucel from the "salt-water lake" lying east of Calcutta; but of the numbers of *Terrapins* which we have seen from that locality, we have sought in vain for this species, which belongs to the peninsula of India, and is the only one which has been there observed, with the exception of Col. Sykes's specimen of *E. Tentoria*. In Ceylon it is replaced by the very distinct *Emys sebæ* Gray.

(2597) *EMYS DHONGOKA*. Since the above was printed, we have obtained another *Emys* from the vicinity of Chaibasa, which appears to be the young of *E. Dhongoka*; and Mr.

Jerdon assures that a large species abounds in the Nerbudda, two feet and upwards, which is probably the same: it is not referred to in Mr. Jerdon's paper, p. 463 *ante*

On the Arakan coast, adults of *E. Dhongoka*, Gray, approaching to 2 ft. in length of carapax, would appear to be very common; but the only young specimen which we have seen of this species was sent down alive from Asam by Major Jenkins, and is now mounted in our museum. The adults have much the appearance of *Tetraonyx Lessonii*, D. and B., but are readily distinguished by having five instead of four claws to the fore-feet.

(2598) *TETRAONYX LESSONII* abounds at the mouth of the Hugly, and great numbers are brought to Calcutta, where they are eaten by particular castes of Hindus, and are even kept for sale in tanks. Though the water-Tortoises generally are much used as food, the species chiefly consumed, or at least which are brought in greatest quantity for that purpose, are *Tetraonyx Lessonii* and *Emyda Punctata*. The latter appears to be the most generally diffused species of Tortoise throughout the whole of India and Ceylon, and is very abundant in Lower Bengal, burrowing deep into the beds of tanks when the water dries up. A large one which escaped into the Society's compound was found several months afterwards in a healthy state, buried among the roots of some guinea-grass.

A small and evidently young *Emys* from Arakan or Tenasserim would seem to be

(2599) *EMYS OCELLATA*, Dumeril and Bibron. The colouring agrees with the description: the details of structure less completely. Length of carapax 6 in. (measured straight). It is affined to *E. thurgii*; and as compared with a specimen of *E. thurgii* of the same size, it is at once distinguished by having the whole under surface of the shell spotless yellowish-white, and each lateral or discoidal plate of the carapax is marked in the centre with a large round reddish-brown spot, surrounded by a pale areola; an interrupted black line along the spinal ridge, which is raised into keels on the first four vertebral plates. These are of equal breadth, whereas in *E. thurgii* the first is much narrower than the others. Nuchal plate twice as long as broad, and throughout equal; whereas in *E. thurgii* it is triangular with posterior base. Hindmost vertebral plate much narrower than in *E. thurgii*; and the posterior marginals and especially the caudals are much smaller than in that species. Colour of the upper parts greenish olive-brown, with the ocelli before mentioned, will probably become obscured with age. Head brown above, with yellow superciliary line meeting its opposite over the nostrils,

## REPTILES OF INDIA,

Limbs and under parts apparently yellowish without markings.

There is a species of Chameleon in the Society's old collection, the origin of which is unknown, but it would appear to be undescribed. It would seem to be most nearly allied to *C. cucullatus*, Gray, and has the occipital flaps of both that species and *Ch. delepis*, Leach.

(2600) *CHAMELEON VERRUCOSUS*, Blyth. Body minutely tuberculated, with large tubercles regularly interspersed throughout. The latter are smaller and contrast less strongly on the limbs and tail, and are more thickly set upon the limbs. Ridges of the back and throat serrated, the tubercles becoming smaller towards and upon the tail. Beneath, the tail is smooth, though tending to exhibit a slight serrature towards its base. Superciliary ridges not uniting together, either before or behind; and a small medial occipital ridge continued to the base of the two lateral flaps or lappets of skin. Colour of the specimen blanch- ed; but there is a strongly marked black streak proceeding backward from the axilla, and sur- mounted by a white streak, the two occupying the space which may be concealed behind the humerus. Length  $11\frac{1}{2}$  in., of which the tail is 6 in. Hab. unknown.

(2601) *LEIURUS BERDMOREI*, nobis (*Geck- oide*). Agrees with Mr. Gray's definition of *Lei- urus*, except that there is no appearance of the toes being webbed at base. Colour grey, with 4 longitudinal blackish streaks along the back and sides, 3 or 4 interrupted crossbands of the same on the upper surface of the tail, a medial black streak on the nape, and others successively diverging on each side of it, and a black streak from before the eye continued to the shoulder. Some mottling also on the limbs. Hab. Mergui, where procured by Capt. Berdmore.

(2602) *STELLIO*. The genus *Stellio* is new to the Indian fauna. A species from Upper Hindu- stan cannot be safely separated from the Arabian *St. Cyanogaster*, Rüppell, unless upon compari- son of specimens. The tail, however, appears to be longer; and there is a slight gular fanon. Spe- cimens very much in colour. An adult from Mir- zapore, presented by the late Major Wroughton, measures  $12\frac{1}{2}$  in. long, of which the tail is 8 in. Throat blue, spotted over with yellowish-white, deepening to purple on the *Fanon* which is less spotted. The rest of the lower parts are yellowish- white, marbled on the transverse fold of the neck and immediately behind it with blackish, and spotted with the same on the breast and belly, the spots becoming less numerous on the latter. Upper parts dark olive-green, the back and sides speckled over with whitish. Two smaller speci- mens were presented to the Society by L. C. Ste- wart, Esq., now of H. M. 61st Regt., from Wuzcerabad. Length of one  $8\frac{1}{2}$  in., of which the

yellowish-white, suffused or marbled with bluish or pale dusky on the throat, and slightly spot- ted with the same on the breast. Upper parts paler olive green than in the large specimen; the back and side speckled with yellowish-white in one, as in the adult example, with traces of dusky marbling on the back; in the other, the back is much more marbled and blotched with dusky, and has only a few largish dull white spots on the back and sides, while the limbs and tail are banded, and there are three dark transverse lines over each eye. If new, *St. indicus*, Blyth.

(2603) GENUS *CALOTES*, Kaup. We have now nine well marked species of this genus in the museum, the first three are distinguished by a pit or fold before the shoulder, which is lined with minute scales.

(2604) *CALOTES EMMA*, Gray (vide "Proceed- ings of the Asiatic Society" for May, 1853, p. 413) Inhabits Mergui, and probably other parts of Burma, ranging northward perhaps to the Khasya hills; but extremely doubtful as an inhabitant of Afghanistan. We have elsewhere expressed our suspicion (*loc. cit.*) that collections made by the late Dr. Griffith in Afghanistan and in the Khá- sya hills had become mixed and confounded, and hence that Mr. Gray had been led to assign his *Calotes Emma*, *C. Maria*, *C. Minor*, and *Salea Horsfieldi* to Afghanistan, and two of the four to the Khásyas also; countries so extremely differ- ent, that it is most improbable that the same species would be found to inhabit both of them.

(2605) *CALOTES MYSTACEUS*. Dumeril and Bibron. (Described *J. A. S. XXI*, 754). Inhabits Burma, and also the mountainous parts of Cey- lon. Hind-toe reaching to the ear.

(2606) *CALOTES ROUXI* (?), Dumeril and Bi- bron. Three adult specimens and another half grown forwarded by Dr. Kelaart from Newera Elia, in Ceylon, accord fully with the description as regards structure; but the colouring is re- markable, and different again from that of Mr. Jerdon's supposed *C. Rouxi* of S India. Pit before the shoulder more developed than in *C. Mystaceus*, and partially black. Hind-toe reaching to the eye. A row of 3 or 4 raised spines above the tympanum; and nuchal crest moderate and gradually diminishing to the tail. The latter is tumid at base, and soon attenuates rather sud- denly, the tumid portion exhibiting a median ridge of very broad keeled scales. Caudal scales towards the base of tail much larger than those of the body. Throat scales very broad and flat, with a median row of narrow compressed scales imparting the appearance of a small *fanon* or dew- lap. A half-grown specimen (in spirit) is blue, with the tail reddish-brown to near its base, and mark- ed with an irregular double series of *ocelli* which



is a black mark between the eye and the ear, and another below the eye; and a tinge of ruddy on the throat, about the tympanum, and on the occipital and tympanic spines. Adults (in spirit) have the body and limbs blue, the tumid base of tail green, and the rest of the tail dull red-brown, with *ocelli* less bright than in the young. Borders of lips black, continued as a broad black band (more or less variegated with ruddy-white) to the shoulder-pit. Throat whitish tinged with ruddy and strongly contrasting, as also a white band from the tympanum continued over and passing the shoulder-pit. In some, the shoulder-pit is also posteriorly margined with a white mark; and raising the fore-leg two or three additional white stripes are seen, oblique and successively more inclining to the horizontal. The limbs are also banded with white; but these markings are often indistinct or obsolete. Tumid base of tail bright orange underneath in some specimens. *C. Rouxi* is described from Burmah; but as we possess the preceding species both from Burmah and the mountains of Ceylon, it is the less improbable that the present may have the same habitat.

(2607) *CALOTES GIGAS*, Blyth. (Supposed *C. Ophiomachus*, *J. A. S.* XI, 870). Resembles *C. Versicolor*, except in being much larger, having no trace of gular *fanon*, and a double nuchal crest of spinelike scales,  $\frac{1}{2}$  in. long in the specimen under examination. Dorsal crest also proportionally more developed than in *C. Versicolor*, and terminating abruptly over base of tail. Length of head and body  $5\frac{3}{4}$  in. Of tail —? Of hind-limb  $3\frac{3}{4}$  in. Colour apparently uniform without markings, but the specimen is much blanched. Hab. —?

(2608) *CALOTES VERSICOLOR*, Daudin. The most common and generally diffused species, inhabiting all India and Ceylon, from the base of the Himalaya southward, and (according to Mr. Gray) also China and Afghanistan (vide, however, remarks on *C. Emma*). It is the only species we have in Lower Bengal, where it is excessively abundant, particularly in gardens. Sir A. Burnes sent a specimen from Sindh; and we have also one from Rangoon. In the last, however, the scales are somewhat smaller than in Indian specimens, and the two detached spines on the tympanic ridge are remarkably minute; but there is no other difference. Ceylon specimens, on the other hand, appear commonly to attain a greater size, with somewhat larger scales, the nuchal and dorsal crests and also the gular *fanon* being rather more developed and they are then the supposed *C. Rouxi* apud Blyth of *J. A. S.* XXI, 354; but smaller and younger specimens from Ceylon are quite undistinguishable from Bengal examples; and it may even be that the latter sometimes attain the size and general development of the Ceylon reptile. Some

living examples sent from Galle by Dr. Kelaart are quite undistinguishable from living Bengal specimens. In S. India, again, the changes of colouring (as described by Mr. Jerdon) differ from those of *C. versicolor* of Bengal, and are perhaps the same as in the Ceylon animal. Here the colors are changeable, but no yellow is ever seen; and in the months of May and June, the males chiefly are often observed with the head and anterior third of the body, inclusive also of the forelimbs, tolerably bright red, a large black patch before the shoulder, and all the rest plain greenish-brown. They are often altogether of the latter hue without markings; or the markings come out more or less strongly. The reptile is then commonly brown, lighter or darker, with a series of transverse dusky bands, broken on either side by a longitudinal whitish band which is evanescent, appearing and disappearing and sometimes shewing very conspicuously. A dusky streak through the eye, and three others radiating below and two above it. Three or four oblique streaks on each side of the throat; and others on the limbs. Females are smaller and darker, generally of the hue of the ground on which they lie.

(2609) *CALOTES VIRIDIS*, Gray. Nuchal crest extremely slight; and no decided spines above the tympanum, but three raised angular scales placed not on a ridge, but disposed triangularly and separated apart. In some specimens, probably the females, the latter are scarcely noticeable. There is also a row of five flattened scales from below the eye to above the tympanum. Two longest hind-toes of subequal length and reaching only to the ear. Body scales acutely pointed, especially those of the lower parts. Colours green or brown, mottled with whitish and with dark brown; lips black. From S. India.

(2610) *CALOTES OPHIOMACHUS*, (Merrem). Tympanic ridge with several short and two longer spines. Longest hind-toe reaching to front of eye. Tail extremely long, its terminal three-fourths commonly whitish. General colour green, paler below; with some irregular white transverse bands on the body in adults. Stripe through the eye red; and nuchal crest and throat the same in the breeding livery of the males. One Ceylon example (in spirit) is remarkable for having a longitudinal white lateral band, continued from the shoulder to the tail upon which it becomes broken and lost. Identical from S. India, Ceylon, and the Nicobar Islands.

(2611) *CALOTES PLATYCEPS*, Blyth, *J. A. S.* XXI, 354. Hab. Khásiya hills.

(2612) *CALOTES TRICARINATUS*, Blyth. Founded on a young specimen of a well marked species, affined by the flat form of the head to the last, but particularly distinguished by having

## REPTILES OF INDIA,

three low crests or keels along the nape and shoulders. An oblique row of six large triangular scales over each tympanum, but no spines (perhaps on account of youth). Longest hind-toe reaching to tip of muzzle. Colour (in spirit) blue above, white beneath. From near Darjiling, where procured by Capt. Sherwill.

(2613) *ASPRIS*, Blyth, *n. g.* (*Scincidae*). Affined to *Tropidophorus*, Dumeril and Bibron, but differs much in the arrangement of the shields upon the head, and the face anterior to the eyes is compressed and narrow, with subacute muzzle. Tongue very slightly notched. Teeth extremely minute. Frontal shield elongate-pentangular, attenuating much posteriorly: frontoparietals triangular and contiguous; parietals large subovate; interparietal smaller, elongate and obtusely pentangular; superciliaries, five in number, broad, the two series separated apart by the narrow hinder part of the elongated frontal shield. Scales of the back and upper part of tail rhombic, strongly carinate, the keels running in parallel ridges; of the belly roundish, smooth. Præanal scales 2, large, triangular. Toes 5-5, simple, slender.

(2614) *ASPRIS BERDMOREI*, Blyth, *n. s.* Colour dusky-brown or blackish, the throat and belly ruddy-white, with some cross-bands of the same upon the neck and body, broader and more distinct on the former, and white specks on the lips, chin, and on the under and lateral surface of the tail. Eight distinct rows of keeled scales along the back. Length of specimen  $4\frac{1}{2}$  in., of which the tail is  $2\frac{1}{2}$  in., and head  $\frac{9}{16}$  in.; forelimbs  $\frac{9}{16}$  in.; hind-limbs  $1\frac{1}{8}$  in. Hab. Mergui, where procured by Capt. Berdmore.

(2615) *MOCOA FORMOSA*, Blyth, *n. s.* Length of one 7 in., of which the tail measures half. Scales hexagonal, in six dorsal series. Præ-anal scales similar to the abdominal. Form robust. Frontal shield elongate-pentagonal, broadest to the front, and rounded posteriorly. Inter-nasal and frontonasals lozenge-shaped, or somewhat fan-shaped, broader than long. Frontoparietals distinct, but unsymmetrically divided. Colour olive-green, with black lateral and pale superlateral bands as usual, the former much speckled with greenish-white, and the latter shewing a series of black spots. Between the pale superlateral streaks are five narrow black lines along the nape and body, variegated with angular greenish-white spots. A few such spots appear also on the upper surface of the tail, caused by a scale variegated with black and greenish-white here and there placed. Limbs minutely pencilled with black, and spots or streaks of the same upon the head. Under-parts greenish-plumbeous throughout. This large specimen was procured at Mirzapore by the late Major Wroughton; and others from Wuzeerabad, presented by L. C. Stewart, Esq., now of H. M. 61st Regt., are

smaller and less marked with black, which does not form continuous lines along the back, but variegated scales (black, with pale medial portion,) are throughout scattered, and there are some black markings on the head.

(2616) *MOCOA SIKIMMENSIS*, Blyth, *n. s.* A small species, about 4 in. long, the tail varying in length in different individuals. In one the head and body measure  $1\frac{1}{2}$  in., the tail  $2\frac{1}{2}$  in.; in another the head and body  $1\frac{1}{4}$  in., the tail but 2 in. This difference is probably sexual, the former proportions denoting the male, and the latter the female. The same variation occurs in the species of *Riopa*, Gray. Closely affined to the preceding species, but much smaller, flatter, and more lustrous, with proportionally much more slender toes. Colour of the upper parts nacreous olive-green, with three irregular black lines or rows of specks along the back, not always very conspicuous. A broad black lateral band, becoming obsolete along the sides of the tail, is margined with a glistening pale greenish stripe above, and variegated with spots of the same along its lower half and on the outside of the limbs. Underparts greenish-white, except the tail and below the limbs where the colour is rufous-white. Some have a few dark spots on the throat.

Hab. Sikim, where procured by Capt. W. S. Sherwill.

(2617) *PLESTIODON QUADRILINEATUM*, Blyth, *n. s.* Proportions of *Tiliqua*: the head small, but its plates almost exactly as in *Pl. Laticeps* of N. America. Colour blackish above, pearly white below; two dorsal greenish-white streaks, commencing at the nostrils and gradually disappearing at about the middle of the tail; these streaks being exterior of the two alternating series of medial and hexagonal dorsal scales; also a lateral pale streak from fore to hind limb, which is more or less indicated on the neck and base of tail, close upon the whitish hue of the under-parts. Length  $7\frac{1}{2}$  in., of which the tail measures  $4\frac{1}{2}$  in., of hind-limb  $\frac{5}{16}$  in., China (Hong-Kong?). J. C. Bowring, Esq.

(2618) *EUPREPES MACULARIUS*, Blyth, *n. s.* Affined to *Eu. Cyanogaster*, (Lesson. v *Eu. sechellensis* D. & B.) Like *Tiliqua rufescens*, (Shaw), but the scales of the upper-parts 5-7 carinate, and colour bronzed olive-green above, pale below; the hinder half of back and base of tail above marked with irregular reddish-brown spots, and a broad reddish-brown lateral streak continued from the ear to the middle of the tail, marked throughout with white, which tends to form continuous lines posteriorly. Terminal half of tail whitish. Arms and hind-limbs speckled with white posteriorly. Length of specimen  $5\frac{1}{4}$  in., of which the tail measures  $3\frac{1}{2}$  in. Hab. Rungpore?

(2619) *LISONOTA*, Blyth, *n. g.* Form of *Euprepes*, but more slender, covered with very smooth minute uncarinated scales. Head short



flat, subtriangular as viewed from above, broader than high, with obtusely pointed muzzle. Tympanum distinct, roundish. Lower eyelid scaly. Palatal incision slight, placed far back. Tongue scarcely notched. Teeth very minute. Frontal shield pentagonal, subtriangular, broad to the front, and elongated to an obtuse point posteriorly; the supra-orbitals nearly meeting across. Inter-nasal hexangular, somewhat fan-shaped. Fronti-nasals small. Fronti-parietals two, contiguous. Inter-parietal squarish or diamond-shaped. Limbs well developed. Toes 5-5, the palms and the heels (or exterior portion of soles) granular. Infra-caudal scales larger than those of the body; and two large triangular præ-anal scales.

(2620) *LISSONOTA MACULATA*. Blyth. This species would seem affined to *Plestiodon sinensis*, Gray. *n. s.* Colour (in spirit) greyish olive-green, with a double row of irregular dark spots along the nape and back, and a median line of the same along the tail. On each side a dark band is continued throughout, commencing at the nostrils; and beneath this is a narrow pale streak, then a narrow dark one, and finally a few dark spots on the sides of the throat and belly. Upper surface of the limbs variegated throughout. Lower-parts albescent-greenish. Length of specimen, —head and body  $1\frac{7}{8}$  in., and tail probably about the same, but the tip is wanting. Fore-limbs  $\frac{5}{8}$  in.; hind limbs  $1\frac{5}{8}$  in.: distance apart of fore and hind limbs 1 in. From Assam Col. Jenkins.

(2621) *OPHIOPS JERDONI*. Blyth, *n. s.* A typical species, dark bronze above, black-spotted, with two obscure broad dorsal streaks; below white throughout. Length of head and body  $1\frac{1}{2}$  in., of tail  $2\frac{1}{4}$  in.; of hind-limb, to extremity of longest toe,  $\frac{3}{4}$  in. Femoral pores 7 or 8. Shields of head plaited longitudinally. "Procured at Mhow, in pasture land." T. C. Jerdon, Esq. Since Mr. Jerdon's paper on the reptiles of S. India was ready for publication. With reference to that paper, p. 463 *ante*, he desires to state that "the only specimen of *Homonota fasciata* was taken from the mouth of a snake, in grassy land, near Jaulnah."

(2622) *SPHENOCEPHALUS*, Blyth, *n. g.* A *Sepsoid* form affined to *Sphenops*, Wagler, but with more slender and elongated shape, and the limbs placed more distinctly apart; the anterior minute and fitting into a groove, the posterior as large as in *Sphenops*, and each having but three toes, of which the innermost and next are subequal and the outer much shorter. It is still more nearly affined to the Australian form *Ronia* of Gray, figured in the Appendix to Gray's Journal; but this has still more rudimentary limbs, the anterior merely indicated externally, and the posterior shewing but two digits. Form slender,  $\frac{2}{3}$  cylindrical, quite flat and laterally angulated beneath as far as the vent: the body and tail covered

with small, smooth, lustrous, hexagonal scales, with a median row of broader scales along the under surface of the tail. Head much as in *Sphenops*, but the muzzle more pointed; the upper lip covering the mouth. Tongue broad, triangular, its cleft scarcely perceptible; the incision of the plate small. Teeth very minute. Eyes minute, with semi-transparent lower lid. No external trace of ear. Nostrils terminal, placed in the anterior margin of the nasals, contiguous to the front of each inter-nasal and the rostral; rostral equilaterally triangular; supra-nasal broad, heptangular, with apex to the front; fronti-nasals subtriangular, a little elongated; frontal obtusely subtriangular; parietal inequilaterally pentangular, with obtuse posterior base, single and as large as the frontal. A large subquadrilateral plate under the eye, and three small transversely narrow plates in front of it, and posterior to the nasal plate. A large diamond plate on centre of chin, emarginated anteriorly to admit a small roundish plate which is bordered by the anterior laterals. The tail shorter than the body, and sub-cylindrical, flattened below.

(2623) *SPHENOCEPHALUS TRIDACTYLUS*, Blyth, *n. s.* Very pale brown, a little deeper on the upper-parts. The largest of six specimens, measures 6 in. in total length, of which the tail is 2 in., and distance apart of the fore and hind limbs  $\frac{1}{2}$  in. Length of fore-limb  $\frac{1}{8}$  in., of hind  $\frac{1}{4}$  in. From Afghanistan, Presented by Dr. Allan Webb.

The habit of this curious reptile is indicated by its structure. It is evidently a burrower, probably into loose sandy soil, where it would work its way with its wedge like muzzle, deriving considerable *appui* from its hind-limbs; the minute fore-legs remaining generally close within the grooves into which they fit; the head meanwhile being raised, and the long body arched,—an attitude which most of the specimens assumed when immersed in spirit.

The following is a remarkable limbless lizard from Rangoon, obtained by purchase.

(2624) *OPHISEPS*, Blyth, *n. g.* Form anguine, of nearly uniform bulk throughout, tapering suddenly at the extremity of the tail; no exterior trace of limbs; and the vent placed in the middle of the entire length; the body above, and tail above and below, covered with parallel ranges of quadrilateral keeled scales, the throat and belly with hexagonal smooth scales, and the tapering extremity of the tail with imbricated and rounded scales. A groove on each side from shoulder to vent. Tongue obtusely forked: no palatal teeth; but a single row of small maxillary teeth: the triangular incision of the palate large. Eyes rather small, lacertine; the lids scaly. Tympanum small. Nostrils small, lateral. Head conical, somewhat compressed in front; the cleft of the mouth extending

to beyond the eye. Rostral plate small, broad, triangular; it and the nasals and anterior labials surmounted by numerous small plates and larger representatives respectively of a posterior nasal and united fronti-nasals. Frontal shield large, heptagonal with posterior base; and the parietal inequilaterally pentangular, with anterior base. Fronti-parietals quadrangular. The streaks of the chin are sub-quadrangular and placed obliquely. Along the median ridge of the back the parallel ranges of scales alternate, but not upon the tail.

(2625) *OPHICEPS TESSELLATUS* Blyth, *n. s.* Length of specimen  $12\frac{1}{2}$  in., of which the tail measures  $6\frac{1}{2}$  in. Colour pale dingy buff-yellow, paler below, with numerous plumbeous spots on the anterior half of the body above, composed of scales of that colour, some detached, others placed contiguously to form transverse bands more or less imperfect; all the scales being highly lustrous. There are 14 parallel ranges of them above from lateral groove to groove, and 8 such ranges below. From Rangoon.

*Notices and Descriptions of various Reptiles, new or little known.*—BY EDWARD BLYTH.—(Continued from Vol. XXII. p. 655.) No III of 1854.

(2626) *CALAMARIA CATENATA*, Blyth, *n. s.* (*C. monticola*? Cantor, *P. Z. S.* 1839. p. 50). [Note. "*C. olivaceo fusca, colari, laete flavo, linea dorsali albicante, abdomine citrino. scut. abd. 125; scutel. subcaud. 44. Hab. Naga Hills.*"] No anterior frontals: the vertical plate broad, pentagonal, and almost as large as the occipitals: 13 rows of scales: scutæ 187; scutellæ 41 pairs. Predominant colour dusky above, formed by minute black specks upon a pale ground-tint; below pale buff with an iridescent lustre, and marked with lateral series of square black spots chiefly upon alternate scutæ. Four black lines throughout above, the upper bordering a pale medial streak, which is simple upon the tail, but along the body forms a concatenation of elongated oval spots. An imperfect whitish buff collar, and similar marks before and behind the eye. Length of specimen 17 in. of which tail  $2\frac{1}{2}$  in. From Asám. Mr. Robinson. [Note. This and other species sent by Mr. Robinson, we much suspect are from the Khàsya hills, or other upland territory.] *Beng. As. Soc. Jour. No. III of 1854.*

(2627) *CALAMARIA RETICULATA*, Blyth, *n. s.* Vertical plate hexagonal, angulated to the front, and not half so large as the occipitals: supraorbital large and subtriangular. Thirteen rows of scales: scutæ 136, 138; scutellæ 27, 28 pairs. Colour shining dull black, brilliant and iridescent below: minute yellowish-white specks on the sides of the mouth, throat, and along the sides of the body. In spirit the edges of the scales are seen to be of a deep black, imparting a reti-

culated appearance. The larger of two specimens measures 12 in., of which tail  $2\frac{1}{2}$  in. From Asám. Mr. Robinson.

(2628) *CALAMARIA TENUICEPS*, Blyth, *n. s.* Colour iridescent black above, yellowish-white below. Nearly affined to *C. Longiceps*, Cantor, but the head anterior to the eyes much less elongated, and the posterior frontals consequently are about as broad as long: vertical plate elongate-hexangular, broadest anteriorly: head conical, narrow; the jaws of equal length. Thirteen rows of scales. Scutæ 138; scutellæ 37 pairs. Length of specimen 14 in., of which tail 2 in. From the vicinity of Darjiling. Capt. W. S. Sherwill.

The two following species of this genus are remarkable for having the posterior frontals united.

(2629) *CALAMARIA FUSCA*, Blyth, *n. s.* Of an iridescent dull black colour throughout, the ventrals slightly margined paler. Head small, narrow. Vertical plate pentangular with rounded anterior base, the posterior lateral angles so obtuse in some that the plate might then be described as triangular: occipitals very large, elongated. Thirteen rows of scales. Scutæ 155-7; scutellæ 30-34 pairs. Length 15 in., of which tail 2 in. Young obscurely striated with longitudinal rows of pale dots. From Darjiling. Capt. W. S. Sherwill.

(2630) *CALAMARIA OBSCURO-STRATA*, Blyth, *n. s.* Much affined to last: the muzzle less obtusely pointed, and the anterior frontals conspicuously smaller. Iridescent brown-black, the underparts particularly lustrous; obscurely streaked throughout with a pale band occupying the adjoining portions of the fourth and fifth rows of scales on each side, a narrow pale line also along the middle of each of the first three rows, and three similar narrow pale lines along the back, all alternating with dusky lines. Thirteen rows of scales. Scutæ 153-163; scutellæ 40 pairs. Length of the larger of two specimens  $11\frac{1}{4}$ , of which tail 2 in. From Rangoon.

The next has both the anterior and the posterior frontals, respectively, united or undivided.

(2631) *CALAMARIA BICOLOR*, Blyth, *n. s.* Dusky plumbeous above, buffy-white below, throughout; these colours gradually blending, and not abruptly demarcated as in *C. Tenuiceps*. Vertical plate pentangular, broader than long, or forming almost a triangle laterally truncated: rostral large and broad; the muzzle consequently obtuse; and the head broader and flatter than usual in this genus. Seventeen rows of scales. scutæ 20; scutellæ 75 pairs. Length of a specimen  $19\frac{1}{2}$  in., of which tail  $4\frac{1}{2}$  in. From Asam. Mr. Robinson.

(2632) *CORONELIA CALLICEPHALUS*, Gray. *Ann. M. N. H.*, Dec. 1853, p. 390. [Note



When the above description was taken, we had not seen that by Mr. Gray which is less detailed.] A beautiful species, with form and scutation of head as in the European *Coluber Esculapei* (as figured by Schlegel); but the eye somewhat smaller. Nineteen rows of scales; scutæ 201-211; scutellæ 56-65 pairs. Colour a light brown, paler below. Head with a median black line over the vertical and occipital scutæ, and another continued from each eye to the first of a series of about 18 semi-annuli, which in the young consist of large and broad white-edged black spots, reaching down to the abdominal scutæ; but in adults the black of the anterior of these spots disappears more or less completely, leaving only the pale-margined black edge, so that two narrow black transverse bands remain in place of the single broad black spot of the young: also at about the ninth or tenth of the latter from the head, two narrow black dorsal lines commence, which at first are broken and irregular, but gradually become continuous and well defined towards and upon the tail, where they cross its transverse bands and are continued to the extreme tip. Length of a specimen 27 in., of which tail 4 in. From Asàm. Mr. Robinson.

(2633) *XENODON PURPURASCENS*, Schlegel. The varieties of colouring of this snake are extraordinary; even more so than those of *Lycodon Aulicus*. Two adults in spirit from Goalpara are entirely of a pale colour (evidently, however, much blanched), *without traces of markings*. Another, from Asàm, is of a dull red brown above, with narrow black transverse band; lower-parts reddish pearly, with two rows of somewhat indistinct black spots, mostly on alternate scutæ: head-markings indistinct. A third variety (*Coronella albocincta*, Cantor, P. Z. S. 1839, p. 50), also from Asàm, is of a clay colour, the scales black margined and sprinkled over with minute black spots, and the entire length marked with above 24 black-edged white semi-annuli; beneath, the black spots are more developed than in the last variety, and are more or less continuous towards the vent: the usual head-markings distinct. Two others, from Goalpara and Lower Asàm, nearly resemble the last, but have no white semi-annuli, nor markings underneath the tail or anterior third of body. Others, again, from various parts, including central [Note. Ammerkàntak, towards source of Nerbudda; 3700 feet elevation.] and S. India and Ceylon, also the Tenasserim provinces, have the upper-parts more or less dark, and variously freckled, often with imperfect semi-annuli placed near together, and alternately distinct and comparatively obscure: the underparts commonly spotless; and sometimes the collar quite black. A single young specimen from Ceylon has 3 rows of black spots continued upon each scuta as far as the vent, where the medial row ceases, and the other two rows are

continued to the tip of the tail: above, the black semi-annuli are divided, and the halves placed alternately to the right and left, becoming gradually indistinct upon the hinder half. Upon a first view, this might be considered a distinct species; but we can perceive no structural variation from the rest, and intermediate varieties most probably occur. In all, save the first, the peculiar markings of the head readily indicate the species; as do the rostral and anterior frontal plates from other Indian serpents.

(2634) *COLUBER NIGROMARGINATUS*, Blyth n. s. Nearly affined to *C. Radiatus*, Schlegel, but attaining the size of *C. Mucosus*, L., (*V. Blumenbachii*, Merrem): our largest specimen measuring  $7\frac{3}{4}$  ft. long of which the tail is 2 ft. 1 in. Colour a bright pea-green (changing in spirit to blue), paler below, each scale of the upper parts margined with black. Upon the shields of the crown the black margins are extremely slight though present, and they gradually increase in breadth posteriorly until about the middle of the entire length, when the two colours resolve into four black, alternating with three narrower blue, streaks which are continued to the end of the tail. Eye larger than in *C. Mucosus*, much larger than in *C. Radiatus*. One large superior and one small inferior præ-ocular plate; and a single frænal, the latter as in *C. Radiatus*, to which the present species bears a near approximation in the details of its structure. Sixteen rows of scales, the four median slightly carinated. Scutæ 192-4; scutellæ 116-132 pairs. Hab. Vicinity of Darjiling, where procured by Capt. W. S. Sherwill, who sent with it examples of *C. Radiatus*, *C. Korros*, and *C. Fasciolatus*. Dr. Kelaart has also favoured us with *C. Korros* from Ceylon; but the species does not appear to have been hitherto observed in the Indian peninsula.

(2635) *COLUBER PRASINUS*, Blyth, n. s. Wholly green, becoming verditer in spirit; glaucous below and bordering the mouth: 19 rows of slightly carinated scales; scutæ 205, 6; scutellæ 107, 8 pairs. Vertical shield triangular with rounded apex; rather larger than the supraorbitals, and rather smaller than the occipitals: a single large præorbital, and one elongate-oval frænal. Tail suddenly tapering. The larger of two specimens measures 37 in., of which tail 9 in. From Asàm. Mr. Robinson.

(2636) *COLUBER HEXAGONOTUS* (?) Cantor, [Note. J. A. S. XVI, 921.] var., adult. Length 4 ft., of which tail  $15\frac{1}{2}$  in.; the latter remarkably slender. Colour brown, paler below; the anterior fourth of the body marked with transverse dusky bands, which become gradually more obscure till they disappear. Seventeen rows of slightly imbricated scales, the median row hexagonal. Vertical plate large, pentagonal, broad to the front. Two præ-orbitals, the lower small

and bordered by the third and fourth labials; the fourth labial bordering the eye, which is of moderate size; two post-orbitals, and a third or infra-orbital bordering on the fourth, fifth, and sixth labials: nasals large, elongate, the nostril opening in the middle, near the outer border of the anterior frontal; a single small subtriangular frænal. Scutæ 195; scutellæ 144 pairs. Hab. Arakan (Ramei)?

(2637) *COLUBER DIADEMA*, Schlegel; *C. Opellii* Wagler. This is a little known species; and two examples of it in our museum (origin uncertain) would not be readily recognised from Russell's plate (11, 30) which would appear to have been taken from an old and remarkably thick individual. One of the Society's specimens is of about equal length to that figured by Russell, but is much more slender; the other is smaller. The markings of the head are very peculiar, as the transverse black band from eye to eye and continued below the eye, and the four black specks on the two occipital plates. Upon the nape is a longitudinal black stripe, followed by a series of black spots along the spine, the first few of them being round, the rest gradually assuming the appearance of short transverse bands, much more regular and placed nearer together than as represented by Russell: towards the tail they diminish in size, and upon it are reduced to a series of minute black specks. Their number, from head to base of tail, amounts to 75. Alternating with the dorsal bands is, on each side, a series of smaller lateral transverse bands, which begin on the sides of the neck as large round black spots, following two oblique streaks behind the eye, and disappear altogether on the tail. They are placed with great regularity; and on the borders of the abdominal scutæ is a further series of black spots, such are the markings of our larger specimen, these being of an unmixed black. In our smaller example, all the dorsal black bands have the middle of each scale marked with the pale clay-colour which constitutes the general ground-tint, the lateral streaks are less decided, but the spots on the borders of the scutæ are more so, and every alternate scuta has an additional spot near each lateral margin. There are 19 rows of perfectly smooth (or not carinated) imbricated scales. Eye rather large: a great upper and small lower præ-orbital; one large subquadrate frænal; two post-orbitals: and the fifth and sixth labials border the eye below. Scutæ 207-8; scutellæ 98 pairs. Length of our larger specimen 36½ in., of which tail 9¼ in.

(2638) *COLUBER PICTUS*, Daudin; *C. Plinii*, Merrem, (Russell, 1, 29). Of this little known species, Mr. Jerdon has favoured us with a young example, from S. India. It is a true Coluber, and not a variety of *Coronella Baliodeira*, Schlegel, as suspected by Dr. Cantor. [Note. J. A. S. XVI, 915.]

(2639) *HERPETODRYAS HELENA*, (Daudin). In the Society's museum are two specimens of a snake, from Darjiling and Rungpore respectively, which may represent a variety of this species. Colour nearly uniform brown above, yellowish-white below with two lateral rows of dusky specks, one speck on each side of every abdominal scuta; a slight dusky streak from behind the eye; a trace of a black V-like mark on the nape; and very obscure indications of body-markings analogous to those of Russell's figure (1, 32). Seventeen rows of carinated scales. The larger of two individuals measures 29½ in., of which the tail occupies 8 in., and head 1 in., Scutæ 139, 199; Scutellæ 84, 90.

(2640) *PSAMMOPHIS CONDANARIUS*, Gray (Russell, 1, pl. 27; very bad). Seventeen rows of smooth scales, of which the first row on each side is very broad, the second row less broad, and the rest narrow and lanceolate. General colour bright green above, pale yellow or yellowish white below: longitudinally striped, except more or less towards the head, with four pale bands: the upper occupying the fourth and half respectively of the third and fifth rows of scales, and bounded above and below with a more or less defined narrow black lines; the lower occupying the lateral margins of the abdominal scutæ and subcaudal scutellæ, and defined above and below with narrow black lines which are very distinct. A pale superciliary streak bordered with black commences from the nostrils, and another below the eye, occupying the upper half of the labials. Some also shew an ill-defined pale dorsal streak. Hab. Lower Bengal?

(2641) *LEPTOPHIS RUBESCENS*; *Dipsas rubescens*, Gray, Hardwicke's *Ill. Ind. Zool.* This seems affined to *Dendrophis rhodopleuron*, Schlegel, from Amboyna. The nareal apertures are remarkably minute and abruptly pierced in the centre of the nasals. Vertical plate narrow. Neck slender. Body much compressed. General aspect of colour reddish-brown, powdered over throughout, excepting on the chin and throat, with minute specks. A row of black spots along the spine. A brown central occipital stripe, and similar lateral stripe from nostril to ear. Seventeen rows of smooth scales. Scutæ 198; scutellæ 120. From Mergui. Capt. Berdmore.

(2642) *LEPTOPHIS ORNATUS*, (Shaw), var. Marked very like young specimens of *Coronella Russellii*, excepting on the head. Colour olive-brown, the upper-parts marked throughout with a regular series of transverse black bars, broader towards the head, narrower and becoming indistinct towards the end of the tail; these black bars set off by whitish edges. Head marked nearly as usual. From Ceylon, Dr. Kelaart.

(2643) *DIPSAS FERRUGINEA*. Cantor, P. Z.



S. 1839, p. 53. Head smooth and flat above, remarkably frog-like with somewhat pointed muzzle: anterior frontals very small; the supra-orbitals larger than the vertical plate. Canines above and below well developed. Tail suddenly tapering. Colour a dull somewhat ferruginous brown above, a little marked with black and white shewing between the scales; a broad dark lateral band throughout, and above it an obscure pale band: lower-parts buffy yellowish-white, with a narrow dark lateral band on each side, and the rest thickly sprinkled over with minute black specks. Head with a narrow black median line over the frontal and vertical plates, and another over the supra-orbital, meeting its opposite on the occipital and continued to the nape: black lines also border the lips and pass through the eye. Seventeen rows of scales: Scutæ 171, 175; scutellæ 56, 64 pairs. Length of one  $13\frac{1}{2}$  in., of which tail  $3\frac{1}{4}$  in. From Asam and the vicinity of Darjiling; Mr. Robinson and Capt. Sherwill.

(2644) *DIPSAS MONTICOLA*, Cantor, P. Z. S. 1839, p. 53. Affined to *D. Trigonota* in structure. Brown above, pearly-white below, separated by a broad black streak behind the eye: lower-most row of scales black-bordered for the anterior third of the body; and traces of other lines towards the head. Fifteen rows of scales: scutæ 158, 193; scutellæ 82, 106 pairs. Length of one 22 in., of which tail  $7\frac{1}{2}$  in. Hab. Asam; Mr. Robinson.

(2645) *DIPSAS NIGROMARGINATA*, Blyth, n. s. Also affined to *D. Trigonota*, with median row of dorsal scales broad and hexagonal. No elongated teeth. Colour throughout green above, the distensible skin black between the scales; yellowish-white below. Twenty-one ranges of scales: scutæ 252; scutellæ 182 pairs. Length of one 42 in., of which tail 11 in. Hab. Asam. Mr. Robinson.

(2646) *DIPSAS TRIGONOTA*, the most common species of India proper, attains to about 6 ft. in length, but is rarely met with so large and preys (at least those of medium size) chiefly on the *Calotes versicolor* in L. Bengal. Vertical shield as broad as in the Malayan *D. Multimaculata*, not less so as represented in Dr. Schlegel's plate. The markings are ill represented by Russell, who figures the young. The very young (about 9 in.) are of a pale ashy colour, with but slight traces of the markings of the adult; a faint lateral band consisting of three parallel somewhat darker lines is continued throughout the length, also a medial and two lateral abdominal lines, besides which the under parts are very minutely speckled. There is a white median frontal streak bordered with black, continued into a black occipital streak. When two or three feet long, the white frontal streak is retained and at the occiput are two diverging white lines, which converge and meet behind at the first of the series of imperfectly trian-

gular white spots bordered and set off with black, which are continued throughout the body; becoming gradually more ill defined towards and upon the tail. The lower-parts are now pearly-white, a trace only of the lateral abdominal lines appearing as a row of small spots on each side, though not regularly upon every scuta. The full grown adult is altogether much darker, with the white markings tending to become obsolete; a conspicuous median black stripe is continued over the forehead and occiput, and another proceeds backward from each eye. Abdomen more or less speckled, with the lines of lateral spots more or less apparent.

(2647) *TROPIDONOTUS ZEBRINUS*, Blyth, n. s. (*Tr. chrysargos*,) Schlegel, var. ?) Vertical plate twice as broad as the superciliary, and of same length. One præ-orbital and three post-orbitals. Upper parts (in spirit) deep plumbeous, obscurely spotted with black; the sides and under parts yellowish white, the former throughout banded with black, and each band having a whitish spot (probably yellow in the recent specimen) above it. Head plumbeous above, the labial plates with a triangular black spot at the point of junction of each of their above, and exhibiting thus two larger spots posterior and two smaller anterior to the eye. Two or three distinct black bands across the nape. Rows of scales 15; scutæ 137; scutellæ 96 pairs. Length of specimen (which is quite young)  $10\frac{3}{8}$  in., of which the tail measures  $8\frac{1}{2}$  in. From Mergui, Capt. Berdmore.

(2648) *TROPIDONOTUS ANGUSTICEPS*, Blyth, n. s. Head narrow, not broader than the neck, little depressed, the eye much larger than in *Tr. umbratus*, and vertical shield broad. Colour (in spirit) plumbeous above, uniformly spotted with black throughout; below white more or less variegated with black on the hinder half: head without markings but a V-like mark on the nape with apex-towards the occiput becoming obsolete in adults. One specimen has 4 præ-orbital and 5 post-orbital plates; but in general these number 2 or 3 and 4: and the same specimen is remarkable for having no dark markings above, but some indistinct pale spots, probably of a vivid colour on the recent snake. In an adult the black spots on the upper parts are almost confined to the skin between the scales, and there is no blackish colour on the hinder half underneath. Seventeen rows of scales: scutæ 167, 172; scutellæ 57, 67 pairs. Length of an adult 41 in., of which tail  $8\frac{1}{2}$  in. Inhabits Asam and Arakan.

(2649) *TROPIDONOTUS SUBMINIATUS* (?), Schlegel. A most variable species, affined in structure to the preceding. One 16 in. long has the upper-parts speckled over with black and bright yellow on a greenish ground, under-parts whitish throughout. Head plumbeous above: a large black patch behind the eye,

occiput, surrounded except in front by orange-yellow border, behind which again the nape is bright vermillion, chiefly between the scales. A conspicuous black streak below the eye, and two black spots posteriorly towards the gape: scutæ 147; scutellæ 94 pairs. Another, rather larger, has the back almost plain dark plumbeous, paler and spotted with black towards the nape; lower-parts freckled with minute black specks, and increasingly so to the tail tip: occiput and nape green, crossed with two orange bands, becoming redder posteriorly. All the upper labials with a black strip, where each adjoins the next. Scutæ 157; scutella 66 pairs. A third, 29 in. long, has the upper-parts dark olive brown, with bright yellow spots on the skin between the scales; the lower dull pearly: nape green, followed by a vermillion space: a single broad black streak below the eye. Scutæ 155; scutellæ 83 pairs. The above three specimens are from Asam. Numerous others from Rungpore and Arakan, are mostly similar to the last, with generally a double black streak below the eye uniting beneath, rarely a single streak, and one large specimen has no streak below the eye: this would seem to disappear with age. Rows of scales 17, 19: scutæ 150, 166; scutellæ 60 to 90 pairs, but generally intermediate. Tail in all suddenly tapering. Largest specimen, which is much thicker than the others (denoting maturity), 3 ft., of which tail  $8\frac{1}{2}$  in.

(2650) *TROPIDONOTUS MACROPS*, Blyth, n. s. Eye very large; the vertical shield broad, and posterior frontals twice as large as the anterior. Prevailing hue of the upper-parts a dull vinaceous, many of the scales margined with black, and some with yellow: a series of yellow spots (about 50 in number) continued along the spine to the extremity of the tail, with a row of black spots on either side. Head and neck plumbeous, diverging on the nape where the first of the series of yellow spots is placed; a slight whitish V-like mark on occiput. Lower parts yellowish-white, with specks and powdering of dusky; more prevalent towards and upon the tail. Seventeen ranges of scales: scutæ 164-6; scutellæ 130-46 pairs. Length of largest specimen 31 in., of which tail  $6\frac{1}{2}$  in.

Two specimens closely resemble, but a third presents some differences of colour. The row of yellow spots is wanting along the spine, also the dark band on the nape, and the pale V-like occipital mark: the under-parts also are more uniformly whitish: scutæ 168; scutella 124 pairs only. All are from near Darjiling. Capt. W. S. Sherwill.

(2651) *TROPIDONOTUS DIPSAS*, Blyth, n. s. Form as in *Dipsas*, slender, the neck much compressed. Head oval, flattened above; eyes large; the muzzle anterior to the orbits short: nostrils small, opening quite laterally;

the nasal and rostral shields being vertical. General colour plumbeous above, obscurely spotted with black, and two barely traceable lines of whitish spots, more distinct towards and upon the neck where they increase in size towards the head. Occiput black, with an elongated white medial spot, and white V-like mark behind it, the apex of which is prolonged a little backwards. A narrow black line from eye to eye passing in front towards the muzzle; and broader black streak posterior to the eye, continued as a series of longish oval spots on the sides of the neck bordering the scutæ. Some black marks also on upper labials. Under-parts white throughout, with a row of minute black specks on either side. Rows of scales 17: scutæ 160;—scutellæ 90 pairs. Specimen (young)  $21\frac{1}{2}$  in. long, of which tail  $4\frac{1}{2}$  in. Vicinity of Darjiling. Capt. W. S. Sherwill.

(2652) *TROPIDONOTUS PLATYCEPS*, Blyth, n. s. A beautiful species, with small and flat (but not broad) head, having much the aspect of a *Herpetodryas*. [Note. Perhaps *H. FRÆNATUS*, Gray, (Ann. M. N. H. December 1853, p. 390,) may prove to be a variety. Young specimens generally shew the two white dots on the occipital shields, seen also in *Tr. umbratus*. Frontal and nasal shields vertical. Head and upper-parts deep green with slightly, black-edged scales; the lower-parts bright yellow with a coral red stripe bordering the abdominal scutæ on each side, and strongly tinging the sides of the body: subcaudal scutellæ variegated with greenish-dusky, and traces of the same about the throat. A white streak bordered with black passes backward from behind the eye and then upward to the occiput, but this would seem to disappear with age. Such is (or was) the colouring of two specimens respectively 27 in. long (of which tail 8 in.), and  $21\frac{1}{2}$  in. (of which tail  $6\frac{1}{2}$  in.) But another,  $21\frac{1}{2}$  in. long, is remarkable for having the chin and throat quite black, also the black markings of the dorsal scales more strongly developed than in the others, and the black marblings of the subcaudal scutellæ are more intense: the lateral coral-red band is merely indicated; and the white streak behind the eye is more strongly developed and continued forward to the muzzle. Number of rows of scales 19: scutæ 174, 86; scutellæ 89, 99 pairs. Another, from Asam, appears identical, but has 155 scutæ only; and in spirit appears of a dull olive-green colour, with two longitudinal pale ruddy dorsal stripes, much as in *Tr. stolatus*, and the lower parts are marked throughout with a black lateral spot on each scuta, seen also in the black-throated specimen. A small young example from the Khasya hills is similar to that from Asam. The three first described are from near Darjiling. Capt. W. S. Sherwill.

(2653) *ELAPS PERSONATUS*, Blyth, n. s. Vertical



## NEW OR LITTLE KNOWN.

plate about equal to the posterior frontals : supra-orbitals large, subquadrangular, elongate. Colour of upper-parts bright red in the adult, brown or reddish-brown in the young : marked throughout with from 22 to 28 narrow black semi-annuli having light whitish margins : under parts dull yellowish-white, mottled throughout with black patches more or less developed : head black above, with whitish muzzle and broad cross band posterior to the eyes. Scales lustrous ; 13 rows above : scutæ 196, 218 ; scutellæ 29, 34 pairs. Length of largest specimen  $24\frac{1}{4}$  in., of which tail  $2\frac{1}{4}$  in. From Asam.

(2654) *RANA ROBUSTA*, Blyth *n. s.* A moderately large Frog from Ceylon. Limbs exceedingly thick and massive ; the third-digits fully webbed. Skin subgranulose, especially on the lower parts. A slight transverse fold on the breast. Colour dusky above with a large black patch on the back, another on the croup, and smaller lateral patches. Lower-parts yellowish-white, with a V-like mark on the lower surface of the thigh in one of two specimens, both males. The same individual has dusky spots or imperfect streaks on the lower surface of the thigh, and its posterior surface is marked with longitudinal streaks of alternating black and yellowish-white. Digital membrane speckled with black. Length from snout to vent 3 inch, and of hind-limb 4 in., of which the foot is half. Presented by Dr. E. F. Kelaart.

(2655) *LYMNODYTES MACULARIUS*, Blyth, *n. s.* Differs from *L. erythræus* by the slightly but distinctly papillose skin of the back, and non-verrucose posterior surface of thighs ; by its shorter and stouter limbs, and short anterior digits, the two outermost of which have their terminal disks smaller than in *L. erythræus*. There is a broad black band from nostril to loin, bordered above and below by narrow pale yellow streaks. Entire lower-parts spotless light yellow, as also the upper lip. A black spot at the shoulder, and line along the posterior surface of the fore-limb. One or more similar lines on the hind-limbs ; the thighs beautifully mottled with black ; and a black medial line along the back, which becomes double over the loins. Length of male from muzzle to vent  $2\frac{3}{8}$  in. ; of hind-limb  $3\frac{3}{4}$  in. ; of which the foot measures  $1\frac{3}{4}$  in. Hab. Ceylon. Dr. E. F. Kelaart.

(2656) *LIMNODYTES LIVIDUS*, Blyth, *n. s.* A large species with short and remarkably fleshy thighs. Colour dusky above, paler and tinged with ruddy on the sides which are spotted with black. Chin, throat and breast, minutely variegated pale and dusky. Belly and thighs underneath, sullied whitish. Above, the thighs and shanks are paler than the back and tinged with ruddy, having several dusky cross-bands. Posterior surface of thigh smooth or non-verrucose. Length from muzzle to vent  $3\frac{1}{4}$  in., and of hind-leg  $4\frac{1}{2}$  in., of which the foot is  $2\frac{1}{4}$  in. From Colombo, Dr. E. F. Kelaart.

(2657) *MEGALOPHRYS GIGAS*, Blyth, *n. s.* (Edible Frog of Sikim, vide J. A. S. XXII, 557.) Adult male  $4\frac{1}{2}$  in. from snout to vent ; hind-foot  $7\frac{1}{2}$  in., of which foot from heel  $3\frac{3}{8}$  in. Breadth of head 2 in. Interdigital membrane of the hind-foot well developed. Fore-limbs extremely thick, with the skin of their inner surface highly granulose. Upper-parts uniformly dull reddish or purplish black, a little marked with white on the posterior surface of the thigh : below whitish, much suffused with dusky, and some irregular white spots or marblings along the rami of the lower jaw, and also on the sides of the body and along the sides of the limbs. What appear to be the young have the head proportionally less broad than in the adult, and the upper-parts have more of an olive tinge, and the under-parts are ochreous-yellow, mottled with reddish-brown. Hab. Sikim Himalaya. Capt. W. S. Sherwill. [Note. Two other forms affined to *Megalophrys*, and like it and *Bombinator*, exhibiting no external tympana, also sent from the Sikim Himalaya by Capt. Sherwill, we have at present no means of classifying, for want of books of reference.]

(2658) *BOMBINATOR SIKIMMENSIS*, nobis, *n. s.* Size and general character of the European *B. Igneus*, (Laur.), but the hind-toes free or slightly webbed only at their extreme base. Male with four large subquadrilateral papillose callosities on the breast, and corresponding callosities on the upper surface of the innermost digits of each four-foot. The tubercles of the head, body, and limbs, much more developed in males than in females. On the back are four irregular rows of large porous tubercles, and numerous minute tubercles without pores stud the rest of the upper-parts. On the hind-limbs small porous tubercles are very regularly disposed. Colour dull livid olive-green above, a little banded of the limbs ; flame-coloured below, more or less marbled with dusky. Presented by Capt. W. S. Sherwill.

(2659) ADDENDA. Since the former part of the foregoing paper was published, the author has had an opportunity of shewing the Society's specimens of Burmese Tortoises to the Rev. J. Mason of Maulmein, who has long devoted considerable attention to the zoology of the Tenasserim provinces. This gentleman immediately recognised the *Testudo megalopus* (J. A. S. XXII, 640,) as the species with which he was most familiar in Burma : at once distinguishing it from the Indian *T. Stellata* : and as his judgment is worthy of confidence, we may pretty safely now rank *T. megalopus* as a third Burmese species of the genus.

At about the same date of publication, appeared a paper by Dr. Gray on some undescribed species of reptiles collected by Dr. Joseph Hooker in the Khásia mountains and Sikim Himalaya. Among them, his genus *Dopasia* approximates

Blyth's Ophiseps (J. A. S. XXII, 655), but is evidently distinct; the position of the vent in Dopasia is not stated. *Parias maculata*, Gray, is identical with *Trigonocephalus nilgiriensis*, Jerdon, J. A. S. XXII, 524, as we find upon comparison of a fine Asamese specimen with the descriptions by Messrs. Jerdon and Gray, and with a coloured figure sent by Mr. Jerdon. Mr. Gray does not give the number of rows of scales or of abdominal or caudal plates. Mr. Jerdon writes—"23 rows of carinated scales, scutæ 142; scutellæ 36." The Asamese specimen has 23 rows of the first; scutæ 143; scutellæ about 36 pairs. Length  $14\frac{1}{2}$  in., of which tail barely two in. Colour pale, variegated with dark blackish-edged patches on the upper parts, forming irregular transverse bands, more or less divided and the halves alternating; below whitish, the plates speckled laterally with dusky; chin and sides of throat blackish; a whitish band proceeding backwards from the eye, another from cleft of mouth, and between them a black space. This Asamese specimen has an elongated black occipital spot, succeeded by two lateral streaks which unite posteriorly; a somewhat different arrangement from that in Mr. Jerdon's drawing, and again different from that exhibited in an example from the vicinity of Darjiling, which also has the underparts much more mottled with black; but all are evidently identical in species.—*Bengal As. Soc. Jour.* No. III of 1854.

(2660) RHINOCEROS. According to Captain Smith, (*Five years in Nepaul*), the Rhinoceros uses its tusches like the boar, in attacking animals. These are the weapons it brings into deadly play and not the horn as may people believe. On one occasion he witnessed a Rhinoceros in Nepaul, destroy an elephant with its tusches. p. 90.

#### (2661) ROSE OF SHARON.

Go, Warrior, pluck the laurel bough,  
And bind it round thy reeking brow;  
Ye sons of pleasure, blithely twine,  
A chaplet of the purple vine;  
And Beauty, cull each blushing flower,  
That ever deck'd the sylvan bower;  
No wreath is bright, no garland fair,  
Unless sweet Sharon's Rose be there.

The laurel branch will droop and die,  
The vine its purple fruit deny,  
The wreath that smiling beauty twin'd  
Will leave no lingering bud behind;  
For beauty's wreath, and beauty's bloom,  
In vain would shun the withering tomb,  
Where nought is bright and nought is fair  
Unless sweet Sharon's Rose be there.

Bright blossom! of immortal bloom,  
Of fadeless hue, and sweet perfume:  
Far in the deserts' dreary waste,  
In lone, neglected beauty placed,

Let others seek the blushing bower,  
And cull the frail and fading flower,  
But I'll to dreariest wilds repair,  
If Sharon's deathless Rose be there.

When nature's hand, with cunning care,  
No more the opening bud shall rear,  
But hurled by heaven's avenging Sire  
Descends the earth's consuming fire,  
And desolation's hurrying blast  
O'er all the saddened scene hath past,  
There is a clime for ever fair,

And Sharon's Rose shall flourish there.—F.

(2662) ROXBURGH, Dr W. formerly Superintendent of the Botanical Garden at Calcutta. Author of the *Flora Indica*. Died early in this century.

(2663) ROYLE, Dr. J. F. A writer on the botany, the commercial products, the cotton and fibrous plants of India. A medical officer of the Bengal army; died in the beginning of 1858.

(2664) RUBY LOCALITIES. Fine rubies have, from time to time, been discovered in many of the corundum localities of Southern India, associated with this gem, particularly in the gneiss at Viralimodos and Sholasigamany. The natives inform that it occurs also in the Trichingode talook and at Mallapollaye, but it is rare, comparatively speaking.

#### (2665) ROTTLERIA TINCTORIA.

*Red powder.*

Room, HIND.	Renee, HIND.
Ralee, HIND.	Kumbhal, HIND.

Abounds in the Kherei jungle, Dehra Dhoon, and Kohistan of the Punjab. The red powder of its fruit, brushed off and sold under the above names in the bazars of the N. W. provinces, is much valued by natives as a vermifuge.

Among the Europeans serving in the Punjab, tape worm is very common. It is also prevalent among the Mussulman portion of the inhabitants. At Mean Meer, Dr. Gordon met with success in expelling the tape worm by a native remedy called Kamila. This remedy, the powder from the capsules of *Rottlera tinctoria*, though not of recent origin, seems to have been first extensively used by Dr. McKinnon, of the Horse Artillery, who published a brief account of it in the *Indian Annals of Medical Science* for October 1853, as an extract from the Superintending Surgeon's annual sanatory report for the Punjab division.

The Kamila has long been known to the natives, and used all over India as a dye; it is also occasionally administered by them as a vermifuge.

In the Patna *Materia Medica* under the name of Kapila (a misprint), its properties are considered as of a warm nature, and given internally as an anthelmintic.

In Dr. Royle's *Materia Medica*, it is mentioned as a native vermifuge, and Dr. Royle seems to think its action depends on the stellate hairs found in the powder.

Kamila is the powder brushed off the capsules



## ROTTLERIA TINCTORIA.

of the *Rottlera tinctoria*, Roxb. It is also found sparingly on the leaves, petioles, and flower stalks of the plant.

The *Rottlera tinctoria* is a species of euphorbiaceæ founded in the hilly portions of India, as along the base of the Himalayas from Assam to near Peshawur, in Central India, in the Northern circars, in Mysore, and at Parell Hill near Bombay. In its habit it is almost arborescent, growing to 20 or 30 feet high.

The genus was named by Roxburgh, after Dr. Rottler, a Danish Missionary, and one of the fathers of Indian Botany.

The powder is of a dark brick red colour, with a peculiar heavy odour, increased on its being rubbed between the fingers.

There are two varieties of it sold in the bazars in the Punjab, the difference consisting in the one having been passed through coarse cloth to free it from impurities, such as portions of the withered flowers, dust or insects.

The only appreciable difference is that this finer quality is cleaner than the other.

To cold water the powder does not impart its yellow colour, but either floats on the surface or falls in small quantities to the bottom. Boiling water becomes slightly tinged by it.

If Kamila is boiled in water to which any of the alkalies have been added, a complete solution of the colouring matter takes place, and it is by means of this property that the natives of India avail themselves of it as a dye. Alcohol and ether dissolve it with equal facility. All these preparations of Kamila have a dark red colour, and the yellow colouring matter is only separated on the addition of certain re-agents. Thus, when the mineral acids are added to the alkaline decoction or infusion, a thick flocculent precipitate of a gamboge yellow colour is thrown down, and the same effect is produced on the alcoholic and ethereal tinctures on the addition of water or the mineral acids. Contact with the atmosphere seems to cause the development of this yellow deposit, as on exposing on glass a thin film of either of the tinctures before evaporation of the fluid is completed, the previously transparent coating becomes opaque and of a light yellow colour.

The process of dyeing seems also to bear on this idea, as silk or cloth is merely dipped in a hot alkaline solution which I have above described as of a dark red colour, and on the drying of the cloth the characteristic yellow colour is developed.

This resinous deposit, on which the active properties of the plant both as an anthelmintic and a dye depend, are obtained in a large quantity from an alkaline decoction of the powder in the following manner. Boil 8 ounces of the powder in two pints of water, along with 1 ounce of the bicarbonate of soda.

This was filtered when cool, and to the filter-

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ed liquid nitric acid was added till the solution became neutral. A considerable quantity of yellow matter then formed in the fluid, which was again filtered, and this yellow residue, when dry, was found to weigh one and half ounces.

It was of a dusky yellow colour, and adhered in lumps of considerable consistence.

The substance probably exists in the plant as an essential oil, and the formation of the yellow coloured deposit, on the neutralization of alkaline solutions and the addition of water or the acids to the alcoholic and ethereal solutions, or by the action of air, consists in the change of the essential oil to a resin, by the loss of hydrogen and the absorption of oxygen.—

In all parts of India the Kamila is extensively used as a dye, especially for silk, to which it imparts a fine yellow colour. It is also employed to dye cotton cloth.

The following is the process of dyeing as pursued in Umritsir, the second city of the Punjab, where a large trade in silk is carried on. Barilla, a coarse preparation of carbonate of potash, obtained by burning a herbaceous species of *salsola* common in the uncultivated portions of the Punjab, is mixed with water, in the proportion of one ounce of barilla to four ounces of water. To this solution, when filtered, the Kamila is added, and they are then boiled together. When the boiling has been continued long enough to extract all the colouring matter, a small quantity of lime is dissolved in the fluid.

The dye is then ready for use, with the exception of the addition of few grains of alum, in order to fix the colour. In some parts of India, I understand that gum is occasionally mixed with fluid, but in the Punjab this is never considered necessary. The characteristic yellow colour is not developed in silk, &c. until after two or three immersions in the dyeing fluid. As a remedial agent, Kamila is well known to the natives.

It is almost only as an anthelmintic that it is employed medicinally by them, though in some districts it is used as an application to cutaneous diseases, especially for itch and fevers.—*Ind. Ann. Medi. Scie.* p. 85.

(2666) RUMINANTS, VARIOUS GENERA OF, by Mr. B. H. Hodgson, *Beng. As. Soc. Journ.* No 181, July 1847, p. 1685.

### CERVIDÆ.

Mrigadi Haranadi. [Note. The Sanscrit postfix *adi*, meaning et cœtera is the probable etymon, and certain equivalent of the Latin *idæ* and *inæ*.]

Hoofs cloven. Postal plane of scull forming an obtuse angle with frontal. Horns solid, falling annually, proper to males only, (save Rein Deer) inserted, superiorly and proximately, below the frontal crest. Front teeth in the lower jaw 8. None above; canines normal and constant, found in both sexes, or in the males only. Mo-

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ears  $\frac{1}{2}$ . Mufle normal and constant (save only in Rein Deer and Elk). Teats 4, normally and constantly. Eye-pits constant. Groin pits vaguely defined or wanting. Feet-pits usually present, in all 4 feet or only in the hind.

(2667) *Genus CERVUS*. Stags.

Mriga Haran.

Horns in males only much branched, 2 basal, one central, and several terminal, snags.

Mufle [Note. See N. B. at end for explanation of all these organs] large covering the front, of upper lip.

Eye-pits moderate and moderately mobile S. shaped.

Feet-pits large in all 4 ? feet.

Groin-pits none.

Calcic gland tuft posterior and external.

Teats four.

Canines in males only.

Types, *Cervus elaphus* of Europe 2 *Cervus affinis* of Saul forest or Mûl Bârah Sinha and 3 Geàna or *Cervus wallichii* of Tibet. These animals are further characterised by a very short tail, a large disc or pale space round the tail, and no proper mane. The Indian ones are confined to vast primitive forests on the plain.

(2668) *Genus RUCERVUS*.

Baraiya or Bârah Sinha.

Horns in males only, with one basal snag and no central one, but their summits many branched as in the true Stags or *Elaphus*.

Mufle large, covering front of upper lip.

Eye-pits moderate, mobile moderately.

Feet pits?

Groin-pits none.

Calcic gland and tuft?

Teats four.

Canines in males only.

Type, *Cervus elaphoides vel duvaucelli*.

This is the Baraiya or Bârah Sinha. It inhabits reedy marches and islands of great rivers along the whole Eastern and Northern skirt of Bengal and Hindostan. Never enters the mountains or forests. Herds enormous in the Islands of Brahmaputra. These animals are further distinguished like the true stags, by the absence of the heavy mane of the Rusas, and by a short tail which however has no true caudal disc and is longer than in the stags proper. ?

(2669) *Genus PROCERVUS*.

Gonr. or Gower and Ghòs.

Horns in males only, small, smooth, greatly divergent, and much bent in the beam, like Bos and furnished with only one ? snag which is basal and forward, another subterminal?

Eye-pits medial, vertical.

Feet pits none.

Groin pits none.

No calcic tuft nor gland?

Teats four.

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Tushes in males only.

Type *Cervus dimorphe*. The Gonr. or Ghos.

Habitat Saul forest.

Further subordinate marks of this genus are:—

Tail short. No caudal disc. A mane.

The Gowers are not gregarious. They are confined to the Saul forest so far as appears. With their rutting season and gestation, unacquainted. Intestines 56 feet, small 29, great, 27, Cæcum, 19 inches by 4, diameter of small gut  $\frac{3}{4}$  inch. Liver 3-lobed and a lobulus. Lungs 4-lobed Gall-bladder.

(2670) *Genus RUSA*.

Samber, Jarai, (vulgo Jerrow.)

Horns in males only, trifurcate: 1 basal and 1 subterminal snag. No central one.

Mufle large, covering the front of upper lip.

Eye-pits very large and completely reversible.

Feet-pits large in all 4 feet.

Groin-pits none.

Calcic gland and tuft, posterior and external.

Teats four.

Canines in both sexes.

Type, *Hippelaphus* or the Sambur, and *Aristotelis* or the Jarai: both continental species of India.

Also, in the Islands, *Equinus Peronii*, Etam, and *Marriannus*: but they want testing all of them.

Habitat, all the great forests of India and of its islands, and to a certain extent, the mountains above them, where the other large Deer are never seen.

These animals are not gregarious: they have a long bluff tail like that of a docked horse, no disc round it; but a heavy mane over the whole neck.

One anomalous species thence called *Heterocerus* has no upper snag to its horns. [Note Another large Deer of the Indo-chinese ranges of Hills is *Panolia Eedii*, the *Cervus frontalis* of Mr. McClelland. Not found West of the Brahmaputra.] The Rusas rut in spring and then drop their horns.

Their females gestate 3 months and produce young in winter, occasionally so early as the end of October, and one at a birth. In confinement the horns are usually dropt in April and take six months for their perfect replacement. The horns are not complete in form till the 4th year nor in size till the 8th year. Small gut 52 feet. Large 31. Cæcum 15 inches by  $4\frac{1}{4}$ .

(2671) *Genus AXIS*

Chittal. Chittra-chittri.

Horns in males only, with one basal and one subterminal snag as in *Rusa*, but the beam more bent and the horns paler and smoother, and closer grained in structure.

Mufle large, covering front of upper lip.

Eye-pits large, very mobile.

Feet-pits large in hind feet only.



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Groin gland large; sinus vague.

Calcic gland and tuft, postcal and external.

Teats four.

Canines in males only.

Types, 1, *Axis major vel maculatus vel nudipalpebra*, or common spotted Deer or Chittal; 2, *Axis medius* or lesser spotted Deer or Jhow Laghuna; 3, *Axis porcinus vel niger*, or Hog Deer, or Para or Khae Laghuna, or Sugoria.

Habitat, general over the plains of India whence the progress of cultivation has long since driven the larger Deer or Barah Sinhas and Pusas and Gowers recte Gaur. These animals have a smooth, generally spotted, coat, no mane, and a long tail reaching to the back and ending in a point. It is singular that H. Smith should question their having eye-pits and canine teeth.

The spotted Deer are gregarious, the herds being often very large: the Hog Deer are less so, dwelling more in families. Their breeding season is May, June: their rutting season December, January. They gestate 6 months. Intestines of lesser spotted species  $65\frac{1}{2}$  feet, whereof the small are 40 and the great  $25\frac{1}{2}$ . Cæcum  $9\frac{1}{2}$  inches by  $3\frac{3}{4}$ , and 5 inches of gut below it, of same calibre; rest equal and narrow. Intestines of Hog Deer  $41\frac{1}{2}$  feet whereof the lesser are  $24\frac{1}{2}$  and the larger  $16\frac{3}{4}$ . Cæcum  $8\frac{1}{2}$  inches by  $2\frac{3}{4}$ . They rut and breed like the spotted species.

(2672) *Genus STYLOCERUS*, or Stilthorn or Muntjac.

Dària-Mriga; Ratwa, Kaker.

Horns in males only, small, raised on high hairy pedicles, and having only one snag which is basal.

Females with bristly tufts ending in knobs instead of horns.

Eye-pits very large and extremely mobile. Facial creases, large, mobile, glandular, placed along inner side of horn pedicles towards their very forward salient bases.

Feet-pits large, in hind feet only.

No groin-pits.

Mammæ four.

Canines in males only? large, trenchant, and exerted, as in the Musks.

No calcic gland nor tuft.

Types 1 sp. *Vaginalis* or the Kijang of Indian Islands.

2 sp. Ratwa or the Kaker of Indian Continent.

Habitat, general in India mountains and in forests at their bases. Never elsewhere. Seldom seen above 7000 feet in the Sub-Himalayas.

The Muntjacs are not gregarious though 6 or 8 are occasionally found together. They prefer the dells to the tops and the close to the open cover. Copse or brush wood of the Chinese bambu is a favorite retreat. They bark all the year but particularly in winter when the males are wanton. January, February is the common

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rutting, and June, July the common breeding season: the gestation being 6 months, but they breed occasionally at any season though only once a year, and have one or two young at a birth.

The males horns fall in May and are perfect again in August. Intestines male 61 feet, whereof the small are 44 and large 17 feet. Cæcum 15 inches by  $2\frac{1}{4}$  inch and 9 inches of gut below it of same size. Rest,  $\frac{1}{2}$  to  $6\frac{3}{4}$  inch wide. Intestines female, 14 feet, whereof small 34 feet and great 15. Cæcum 12 inches by two, 12 inches of gut below it of like diameter.

### MOSCHIDÆ: THE MUSKS.

Kasturadi Mushkadi. [Note. See note in p. 688]

Feet cloven: no horns front teeth and below, none above. Molar teeth  $\frac{9}{8}$   $\frac{5}{8}$ . Canines large: cranium cervine with the two planes gradually blended.

(2673) *Genus MOSCHUS*: kastura. Mushk Hirn.

Musle large, as in Deer.

No eye-pits.

No feet-pits.

Large caudal gland with lateral pores.

No inguinal pits.

Calcic tuft and gland external postcal.

Large preputial gland and sac secreting the substance called musk, proper to males only.

Teats four

False hoofs very large, acute, and touching the ground.

Canines in both sexes: of males, large and exerted; of females, small.

Types, 1, *Moschiferus*; 2, *Chrysogaster*; 3, *Lucogaster*. Inhabit the great snowy mountain barriers of high Asia from the Himalaya to the Altai, and from Beluttag to the Peling and Gajar. The Musks are confined to the snowy region and glassy precipices which they leap with a power and security far more than Caprine, though owing to the unequal length of their legs they can descend slopes only with difficulty and falling are caught. They cannot climb at all, as Goats do, and are solitary. They rut in winter and produce young in summer (May, June) gestating 100 days. In 6 weeks the young can shift for themselves and the mother drives them off. They can procreate ere they are a year old and live 10 to 15 years. One usually is produced at a birth in the cavities of the rocks. Intestines 33 to 36 feet, whereof the small are 23 to 24 and the great 10 to 12 feet. Cæcum simple 8 to 9 inches by 1; mean diameter of gut 1 inch. Gall bladder [Prof. Owen doubts this. I have tested it a dozen of times since Dr. Campbell and I made the first examination in Nepaul] constant. (See Journal No. 87 and 118 and *Gleanings*, No. 34)

(2674) *Genus MEMINNA*: Pisora, Pisé.

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Mufle large  
No eye-pits.  
No feet-pits.  
No groin-pits.  
Calcic gland nude and external.  
No preputial bag.  
Four teats.  
False hoofs, ordinary, small.  
Canines not exerted, and confined to males.  
Type, *Memina Indica* Pisora and Pisai.  
Inhabits the forests of India in all parts, near to, but without the various ranges of Hills.

### CAVICORNIE MINORES.

Lesser hollow horned Ruminants or Flocks.  
Hoofs cloven. Occipital plane of skull forming a small or large angle with frontal plane. Horns hollow, sheathed persistent, with thin and dense or thick and porous cores. Mufle small, for the most part, or wanting. Front teeth 8 below. None above. Canines present or absent. Molars  $\frac{a}{8}$  or  $\frac{a}{9}$ . Teats 4 or 2. Eye, feet, and groin, pits, present or absent.

### ANTELOPIDÆ.

Antelope kind.

Sasinadi.

Occipital plane of skull forming an obtuse angle with the frontal plane. Core of the horns thin, consisting of dense bone often with a clear sinus at the base within. Horns seated on the superior surface, below the crest of the frontals, and apart at bases. Canines frequent. Mufle present or absent. Teats normally 4 or 2. Feet-pits in all 4 feet or only in the hind ones.

Eye-pits present or absent. Groin-pits present or absent.

N. B. These animals have also occasionally maxillary, intermaxillary and post orbital sinuses, the number and high development of these organs being one decided characteristic of the family.

### (2675) *Genus* TERACERUS.

Chousinha, Chouka.

Horns in males only four in number. Two inter-orbital; and two behind eyes, but below crest of forehead.

Mufle large, as in Deer.  
Eye-pits medial, linear, longitudinal.  
Feet-pits in hind limbs only or none.  
No inguinal pits.  
No calcic tuft or gland.  
Teats four? two?  
Canines in the males.

Types 1, Chekara; 2, Quadricornis; 3, Subquadricornutus; 4, Jodes; 5, Pacceroois. (See Calcutta Journal Natural History for May, 1847.)

Inhabit the forests of India generally. Avoid mountains and open plains. Not gregarious. Rutting season, summer. Breeding season, winter. Gestate 6 months, most young born in January, February. They are very shy, and when hunted ie close or go off far ahead bounding like the

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common antelope, and hence one of their names, from chouk, a leap.

### (2676) *Genus* ANTELOPE.

Antelopes Proper. Sasin

Horns in males only.

No mufle

Eye-pits, medial, very mobile linear, vertically oblique.

Feet-pits large in all 4? feet.

Inguinal pits, large and clearly defined.

Calcic tufts?

Mamma two.

Type, *Cervicapra*. Black Antelope. Barant and sasin.

Very gregarious on the open dry plains of India generally.

I have no notes of their intestines or of the breeding.

### (2677) *Genus* GAZELLA.

Ghazal.

Horns in both sexes.

No mufle.

Eye-pits distinct mobile.

Feet-pits very large in all 4 extremities.

Inguinal pits large and distinct.

Calcic tufts?

Mammæ two.

Type Dorcas. Foreign to India.

### (2678) *Genus* TRAGOPS.

Chikara, Kalsipi.

Horns in both sexes.

No mufle.

No eye-pits.

Feet-pits large in all 4 feet.

Inguinal pits distinct.

Calcic tufts postæal.

Mammæ two.

Type, *Antelope bennetti vel christii*, found generally amid ravines of dry plains of India, called Chikara and Kalsipi by natives; Ravine Deer by Europeans. Not gregarious.

These animals have the lyrate horns common to both sexes, the knee tufts, lines along the flanks and ovine hairy nose of the 'Gazelles': but they are wholly void of eye-pits. The dark lustre of their large eyes is as striking as in the 2 last groups. [Note. This is one of the marks by which the Antelopine family may be distinguished from the small pale-eyed Goats or Caprine family.] Gazelles differ from Antelopes in that their horns are lyrate, and that the females also carry them. The Tragops differ from both by the total absence of the sub-orbital sinuses, or eye-pits.

### (2679) *Genus* PANTHOLOPS.

Chiru.

Molar teeth  $\frac{3}{4}$ .

Horns in males only.

No mufle.



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No eye-pits.

Feet-pits large in all 4 feet.

Inguinal sacs, purselike, large, pendent.

Calcic tufts?

Mammæ, two.

Large intermaxillary sacs like double nostrils.

Type, Antelope hodgsonii, Abel. The Chiru.

Habitat open plains of Tibet. Gregarious, rutting season, winter. Breeding season, the summer. Gestate 6 months. One young at a birth. They are very pugnacious and jealous, and in their contests often break off one of their long horns. Hence the rumour of Unicorns in Tibet. (See Gleanings and Journal Asiatic Society, Nos. 2. and 27.)

(2680) *Genus* PROCAPRA.

Goa and Ragoa.

Horns in males only.

No muffle.

No eye-pits.

Feet-pits small in all 4 feet.

Post cornual sinus, large.

No inguinal pores.

Calcic tufts postæal.

Mammæ two.

Type, P. picticaudata. Goa of Tibet.

Inhabits ravines on the open plains of Tibet in small herds or families. See Journal Asiatic Society, No. 173.

(2681) *Genus* KEMAS.

Goral.

Horns in both sexes.

Muffle medial.

No eye-pits.

Feet-pits medial in all 4 feet.

No groin-pits.

Calcic tufts?

Mammæ four.

Type, Antelope Goral. The Goral.

Habit the Sub Himalayas, as far towards the snows as the great forests extend, to which exclusively these animals adhere. Dwell in families 4-6 together. Breed amid crags and rocky recesses. Young mostly born in May, June: gestate 6 months. Rutting season January, February. Produce one young at a birth.

(2682) *Genus* NEMORHÆDUS. Vel Capricornis. [Note. Sumatrensis is Col. Smith's type and Mr. Ogilby says this is identical in structure with the Thar; Mr. O.'s type of capricornis. If so, Col. Smith's generic name will have the priority; if not, it will be the type of Nemorhedus and the Thar of Capricornis. Col. Smith's several species of Nemorhedus are as heterogenous as Mr. Ogilby's of Kemas.

Thar or Saraw.

Horns in both sexes.

Muffle medial.

Eye-pits round and furnished with a very large gland.

Feet-pits extremely large in all 4 feet.

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Groin-pits none.

Calcic tufts none nor gland.

Mammæ four.

Type, Antelope thar. The Thar or Saraw.

Habit the Sub-Himalayas as far north as the great forests extend.

Also, Antelope Sumatrensis of the Islands of India.

The Gorals and Thars have the round black and ringed horns of Antelope, which otherwise they little resemble being short clambering mountain animals, but not, as supposed, affined to the Bovines. The Gorals differ from the Thars by wanting the very glandulous eye-pits of the latter, and both are sundered from the Hemitragæ by their large feet-pits, Antelopine horns, and absence of Caprine odour. The Thars are not gregarious at all. They rush with fearful precipitancy down the steep mountains they inhabit. Rutting season, February, March. Young (one) born in September, October. Gestate 8 months. Small gnt 65 feet. Great 32 feet. Cæcum 15 inches long by 3 wide, and simple. Gall-bladder constant. (See Journal No. 45 for September 1855.

CAPRIDÆ.

Goats and sheep.

Bakaradi.

Occipital plane of skull forming an acute angle with frontal plane. Cores of horns thick porous and cellular. Horns seated superiorly on the crest of the forehead and by their union covering the top of the head. Canines wanting. Teats normally but two, rarely 4. Muffle abnormal and almost invariably absent. Feet-pits in all four feet or only in the fore-feet, or none. Eye and groin pits present or absent.

(2683) *Genus* HEMITRAGUS.

Jharal vel Tehr.

A small muffle.

No eye-pits.

No feet-pits.

No inguinal pores.

Calcic tufts.

Four teats.

Strong caprine odour in males.

Types. 1, Capra Jemlaica. 2 Capra Jharal vel Quadrimammis. 3, Capra Waryatu, whose female is Hylocrius. Habitat the loftiest mountains of India: the Sub-Himalayas near the snows and the highest part of the Nilgiris. A very remarkable type tending to connect the keeled, compressed hollow-horned and odorous Goats with the Deer family which want these marks, but possess the muffle and 4 teats of the Hemitragæ, marks which the true Goats (and sheep) are void of.

The Jharal's retreats are among the most inaccessible bare crags of the Hemachal, close to the perpetual snows, beyond the forests. They feed in the open glades below such crags at early morning and evening, retiring in the day.

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to their awful fastnesses. They are gregarious and the flocks often amount to 40 or 50 animals, but generally do not exceed 20 or 30. If alarmed when feeding they go off at speed with a noise like thunder, but anon halt to gaze on the intruder, whose shot sends them off again under the guidance of an old male whom they all follow blindly. The rutting season is the winter. The females gestate 6 months and produce usually but one young in the months of June, July. The habitat and manners of the wild sheep are very similar to those of the jharals, only the latter are still more dauntless and skilful climbers. If they can but touch a rough edge or crevice now and then they will run up nearly perpendicular precipices of many feet elevation and they will stand on a bit of rock not larger than one's palm looking confidently down over sheer space with not a shrub to break the awful absence of rest for the foot. In February 1842, a male jharal in possession of the Court of Nepal had intercourse with a female Axis, which in July produced a young hybrid of mixed appearance, but more like the mother than the father, and which lived and grew up a fine animal. I saw it last in October 1843. I note the circumstance as a strong corroboration of that affinity of the Hemitragas to the Deer (not Bovines, as Mr. Ogilby supposed) which is indicated by the 4 teats and moist muzzle of the former, notwithstanding that the Hemitragas in all other parts of their structure as well as in their rank odour and in their manners are such perfect goats. From the true goats however they differ, besides grand points noted, by the total absence of beard and of feet pores. Nor could I ever get any progeny from the goats by the jharal, [Note. They copulated freely and I was told would breed. Hence the erroneous statement in the Journal for September 1835, disproved by experiments.] though a male of the latter species had commerce with Goats of several breeds, repeatedly, during the 6 years he lived with me, quite tame and going abroad with the sheep and goats. Small intestines 53 feet. Large, 25-78 feet. Cæcum 1 foot long and  $2\frac{1}{4}$  inches wide. Small gut  $\frac{3}{4}$  inch in diameter; great gut  $2\frac{1}{2}$ . Cæcum simple, that is, not banded nor sacked.

(2684) *Genus* CAPRA.

Bakra. Goats.

Horns in both sexes.  
No muffle.  
Feet-pits in the forefeet only or none.  
No inguinal pores.  
Mammæ two,  
Odour intense in males.  
Calcic tufts none.

Type, *Capra ægagrus*. Habit Persia. Foreign to India, and not therefore subject to my examination, but the several tame races of Tibet and the sub Himalayas (Chandra, Chyann, Sinal) and

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and also the common Goats of the plains (*Dugu* and *Jamnalaria*) are *all* typical. These animals are further distinguished by horns inserted very obliquely, not angular, compressed, and presenting a sharp beveled edge to the front, whereby they may be distinguished at once from all kinds of sheep and also from the Ibexes. They have likewise invariably a true beard common to both sexes, as have also the Ibexes, but the sheep never: and, lastly, the Goats have callosities on the chest and knees or knees only. Eminently bold, saucy and scindent. Gregarious. But in winter. Procreate in summer. Gestate under 5 months? Produce 3, 2 or 1 young at a birth. (See paper on tame Goats and Sheep of these regions. Sp. Mag., for June, 1847.)

(2685) *Genus* IBEX.

Skin. Kin.

Horns in both sexes.  
No muffle.  
No eye-pits?  
Feet-pits none?  
No inguinal pores?  
Mammæ two.  
Odour in Males?  
Calcic tufts?

Types. *Europea caucasica*. *Jaela Sakin Sibirica*. Habitat the loftiest mountains of Europe, Asia, and Africa. Found in the Himalaya close to the snows. These animals with the general manners, the odour and the beards of Goats, are distinguished invariably by angular horns presenting a distinct surface, instead of a mere edge, to the front, thereby differing from the Goats proper and approximating to the Sheep. The front of the horns is likewise remarkably nodose, and the horns are of great size and sickle-like curved. Their structural peculiarities want testing and will doubtless show deviation from the type of *Ægagrus*. Rut in autumn. Breed in spring. Gestate  $5\frac{1}{2}$  months. Produce 2 or 1 kids. Gregarious, bold, and scindent.

(2686) *Genus* OVIS.

Bhéra. Sheep.

Horns in both sexes.  
No muffle.  
Eye-pits large but immobile.  
Feet pits small but present in all four extremities.  
Inguinal glands distinct. Pores vaguely defined.  
Calcic tufts and glands none.  
Mammæ two.  
No odour in males.

Types, *Ovis Ammon* or the Argali of Siberia, and *Ovis Ammonoides* or the Argali of Tibet.

Habitat the snowy barriers of high Asia, *Ammon* being confined to the remoter, and *Ammonoides* to the nearer ranges. These animals are further distinguished as a group by angular, compressed, heavily wrinkled horns turned al-



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most into a perfect circle, and their flat points directed forwards and outwards; by very short disced tails; and by the absence of beard. The wild Sheep proper, or Nyens of the Tibetans, never mix with the Nahoor. They are far more hardy, active and independent than any tame breeds of their kind, as may well be supposed from their terrific abode amid the snowy peaks of Hemachal. They are gregarious, feed in the glens, seek refuge on the tops, and leap and run with Deer-like power, though as climbers inferior to the Hemitragas, and as leapers to the Musks. They are often snowed up for days without perishing, unless their breathing holes should betray them to man, a more terrible foe, than the direct uncleanness of the seasons! They rut in winter, breed in early summer and gestate, it is said, 6 months, probably not above 160 days. The Nyens or Ban Bheras (that is, wild sheep) seldom or never cross the Hemachal, the Indian side of which range is the special habitat of the Nahoor, while to the North and West beyond Tibet, our animals are replaced by other species, so that Tibet may be considered as the special habitat of one species and the plateaux North of Tibet as far as the Altai as that of the other species, above cited as types of the true ovine form, and it may here be added, that the six sorts of tame sheep of Tibet and the Sub-Himalayas, all, without exception, exhibit the essential characters of that form.

\* (2687) *Genus PSEUDOIS*. [See Jour. No, 173.]  
Nahoor.

Horns in both sexes.

No muffle.

No eye-pits.

Feet-pits small in all four feet.

Inguinal glands distinct. Pores vague.

Calcic tufts none.

Mammæ two.

No odour in males.

Types, *Ovis Nahoor* and *Ovis Barhel*.

Habitat the Himalayas.

These animals are contradistinguished, besides the want of eye-pits, by rounded uncompressed smooth horns directed upwards and backwards with great divergency and their round points again bent inwards; by short deer like tails, but longer than in the last and undisced; and, lastly, by the absence of any thing like mane or beard. The Nahoor rut in winter, breed in summer and gestate  $5\frac{1}{2}$  months. Their manners, so far as known, resemble those of the Nyens; but the two never commingle nor approach each other, nor will the males, how long and completely soever they be tamed have sexual commerce with domestic sheep. Great gut 24 feet. Small gut 50 feet. Cæcum 17 inches, by  $2\frac{1}{2}$  wide. Large gut near it, of same diameter. Liver 2 lobed each subdivided and a lobulus. Ribs 13 pairs.

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(2688) *Genus CAPROVIS*.

Moufflons.

Horns in the males only.

No muffle.

Eye-pits small but distinct.

No interdigital pits.

Inguinal gland? pore?

No calcic tuft?

Mammæ two.

No caprine odour

[Note. This is the only form not verified by myself, that I have meddled with, and I am indebted to the Prince of Canino for its characters.]

Further distinguished by horns bent into a half circle over the back, heavily wrinkled, angular and compressed, by deer-like tails, no beard nor mane nor caudal disc.

Type, *Ovis Musimon*. The Moufflon. Habitat Corsica, Sardinia.

N. B. The 'Muffle' is the naked moist skin round the end of the upper lip and nostrils seen in perfection in the ox. The eye-pits are slits or punctures on the cheek, just below the eye. They are round or linear and elongate: and, if the latter, are curved or straight and can be turned almost inside out, are partially or wholly immobile. The 'foot pits' are punctures in front of the pastern, in the cleft between the two bones. The 'groin-pits' are fissures in the groin more or less defined in outline, and furnished with glands which secrete a fragrant viscid substance very like the secretion of the other sinuses.

The 'calcic glands' are placed on the stifle, inside and outside, or only the one, and are often naked and tumid externally. There is a whorl or callous nude spot in many quadrupeds at its side.

The 'tail gland' of the Musks is very large and covers the whole tail nearly, and has a linear longitudinal pore on each side and an abundant secretion.

The 'preputial gland' of the Musks is analogous to that of the civets and screwtail (*Paradoxurus*, vulgo Malwa). It is placed on the prepuce, the penis opening in the midst of it. This organ is clearly subservient to sexual purposes, and so probably are several of the others, though the eye-pits have been variously referred to the facilitation of breathing and of smelling. The supposed end of the interdigital gland and pore or feet-pits, viz, the lubrication of the foot and preservation of the hoof in hot sandy deserts, is clearly erroneous, since the Thar has these organs of an enormous size in all 4 extremities, though it be the tenant of moist cool mountain forests. It is probable that the secretion from the foot pores enables these animals to find one

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Another in those wildernesses of vast forest trees and dense undergrowth which constitute their range.

The shape of the orifice and of the gland, and the nature of the secretion from the latter as well as the periodical augmentation thereof, should be closely attended to—and that *generally*, or with reference to *all* these pits or sinuses. The distinctive form of the upper outline of the skull, and character of the core of the horns in the Antelopidae or Antelope kind, and in the Capridae or Goat and Sheep kind, and again in the Deer kind and Ox kind, sketches will best make understood; and I would suggest particular attention to this point as a key, as well to the mutual affinities as to the differential characters of all these groups. The Antelopes are thus clearly separated from the Goats and Sheep, and distributed into two groups of their own, one that of the typical genera which class with the Flocks; the other, that of the abnormal genera, which range with the Herds.—I meddle not with the last named group or Bovine Antelopes (Bosdorcidae): but in regard to all the others, inclusive of the Musks whose Cervine affinities are thus made palpable, examine well the sketches and note the signal and abrupt fall of the postcal plane of the skulls in the Caprine and Bovine Families, and its gentle slope in the Cervine and Antelopine Families. The Antelopine skull depicted is that of the Thar, and you may thus satisfy yourself at once that this type (as well as Kemas) which agrees [Note. The agreement is not close, so that Goral is osculant towards the Capridae. The characters of both were printed by me (Journal, September 1835) a year and quarter before Mr. Ogilby, December 1836, Zool Jour.] with Nemorhædus in this important point) is an Antelopine not Bovine type. In like manner that is by attending to the form of the skull and the consequent position of the condyles—you may obtain demonstration of the caprine affinities of Hemetrages; and, in fact, the whole genera of these perplexing families may thus be set in order.

I now proceed to the Bovines or Ox kind.

CAVICORNIE MAJORES, or Bovidæ or Herds.  
Gaudrisha.

Hoofs cloven. Occipital plane of skull forming a large angle with frontal plane. Horns hollow, persistent, sheathed with a thick cellular core springing laterally from the apex of the forehead. [Note. These marks of the family may be supposed exclusive to the subfamily: but I apprehend not, and that they will serve usefully to sunder the antelopes allied to Bos and those not so allied, or Antelopidae and Bos dorsiniæ.] Muffle large. Front teeth, above none. Below 8 canine none? Molars 6. Teats four. Dewlap present or wanting.

## RUMINANTS.

### BOVINÆ OR OX-KIND.

Gauadi.

Occipital plane of the skull forming a large angle with the frontal plane. Core of the horns massive and very porous or cellular. Horns in both sexes, inserted laterally on the apex of the frontal crest. Canines none. Muffle very large. Teats invariably 4. Dewlap, in most, normally. No eye-pits. No feet-pits. No groin-pits.

(2689) *Genus* BOS. OXEN.

Gau.

Cranium moderate, compressed, proportional or with excess in the cerebral or facial region. Frontals shorter than the face, flat, and not broader than long.

Occipital plane of the skull square, never arched along the ridge line nor indented by the temporal pits, smaller than the frontal plane and forming an acute angle therewith.

Condyles of great foramen and of lower jaw, elevated greatly, and the jaw much curved.

Horns attached to the highest line of the forehead, rounded, curved up or down or forward ascendantly.

Orbits not salient.

Thirteen pair of ribs.

No true dorsal ridge, but sometimes a fleshy hump.

Muffle very large and square.

Dewlap great.

Type Bos domesticus. Gau.

(2690) *Genus* GAVEUS.

Gavi or Gabi.

Cranium large, having the ample flat forehead as long as the face and broader than long, but not ridged nor curved along its crest.

Occipital plane equal to the frontal plane and moderately indented subcentrally by the temporal fosses, square, and forming an acute angle with the frontal plane.

Condyles of great foramen and of lower jaw low, and the jaw little bent.

Orbits not salient.

Horns attached to highest line of forehead, more or less depressed, and angular, and directed upwards and outwards with little curvature.

A true dorsal ridge but confined to the withers.

Muffle moderate.

Dewlap moderate.

Thirteen pairs of ribs.

Type. Bos frontalis vel Gayæus vel Sylhetanus. The Gavi or Gabi. Habitat trans Brahmaputram, the forests under the ranges extending from Assam to the sea. The Senbar vel Phain may probably be a second species: and Bos Sondaicus or the Benteng a 3rd and the insular species: but these want testing. The first is more than half redeemed from the wild state like the yak of Tibet. The others are entirely



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wild. I possess no memoranda of the soft anatomy or intestines, nor of the breeding season and gestation.

(2691) *Genus BIBOS.*

Gaur or Gauri Gau.

Cranium large, massive, with the frontal and cerebral portions preponderant over the facial.

Frontals as long as the face, broader than long, concave and surmounted by a salient arched crest.

Occipital plane spheroidal, very large, larger than the frontal plane deeply indented centrally by the temporal pits, and forming an acute angle with the frontal plane.

Orbits salient.

Condyles of great foramen and of lower jaw low, and the latter straight.

Horns attached below crest of forehead, sub-depressed, sub-angular, and curving ascendantly.

Thirteen pairs of ribs.

Dorsal ridge co-extensive with the ribs and of great elevation.

Mufle small.

Dewlap small.

Type *Bos gaurus* vel *Cavifrons*. The Gaur or Gauri Gau. Caesar's wild Bull of Europe and Aristotle's of Persia, are two other species of *Bibos* or of *Gaveus*, which could we test them might be respectively called *classicus* vel *Cæsaris* et *Aristotelis*. The Gaurs inhabit the primitive forests of India generally, under the great ranges of mountains, such as the sub-Himalayas, the Vindhias, the Sathpuras, the Glats, Eastern and Western, and their links with the Vindhias, and with the Nilgiris. Beyond the Brahmaputra, *Bibos* is replaced by the last type, of which there would seem to be two species in the Indo-Chinese countries, one of them extending to Ceylon, if the Lanka wild Ox be not rather a *Bibos*; I suspect there will prove to be at least two species of *Bibos*, as of *Rusa*, inhabitants of India between the Cape (Comorin) and the sub-Himalayas or *B. Gaurus* and *B. Cavifrons*.

For the skeleton of the Gaur, I may refer the reader to the Asiatic Society's Journal, No. 114, and No. 69. Of the intestines I possess no memorandum. The period of gestation was in Nepaul always stated to me to exceed that of the common Ox: but Mr. Elliot, will not allow this. The Gaurs rut in winter and procreate in autumn, producing usually but one young at a birth. The herds are ordinarily rather numerous 20, 30, 40, and sometimes even double these numbers, being found together, but in the breeding season, not above 10 or 15 cows with a single mature vigorous bull, who jealously expels every young and old male from his Haram. The sub-Himalayan species entirely avoids the open Tarai on the one hand, and the hills on the other, adher-

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ing to the most solitary parts of the Saul forest: close to and between the salient spurs of the hills where the periodical firing of the under growth of the forest never reaches. In the Deccan these animals are said to penetrate into the hills in the hot weather—very partially, I fancy, or else they must then lack cover on the plain, for they are not a mountain race at all. They feed early and late in the more open glades of the forest, posting sentinels the while and manifesting in their whole demeanour a degree of shyness unparalleled among the Bovines. They never venture, even in the rains, when there is abundance of most rank vegetation to cover their approaches, into the open Tarai to depredate on the crops, as the wild Buffaloes constantly do, nor do they ever associate, or have sexual commerce with the tame cattle, though immense numbers of the latter every spring are driven into their retreats to feed, and remain there in a half wild condition for three or four months when the wild Buffaloes frequently have sexual intercourse with the tame ones of their kind, of which likewise vast numbers are depastured there. Old males of the Gaur are often found solitarily wandering the forests they frequent, especially in winter: but these have probably been recently expelled the herds by their more vigorous juniors, and re-unite themselves with some herd after the season of love and contention has passed. It is exceedingly difficult to rear the Gauri Gau in confinement. Nor did I ever know a successful experiment, though the attempt has been, for 50 years past, constantly made by the Court of Nepal, which finds no difficulty in rearing wild Buffaloes and causing them to breed in confinement with the domestic species, which is thus greatly improved in size and qualities. I have remarked on the excessive shyness of the Gaurs; and it follows that, when approached, they will retreat so long as they can: but if compelled to stand and defend themselves, they do so with a courage and determination not to be surpassed. Their beef is unequalled for flavor and tenderness: but to the aborigines only it is illicit food, and not to all tribes of them, nor are any of them allowed to kill the Gaur in Hindu kingdoms. The Gaur stands from 6 to 6½ feet high at the shoulder, and is either of a ruddy brown, alias tan, or of a black colour, the forehead and limbs below the mid flexures being pale, and the forehead and knees tufted. Capt. Tickell a good observer, believes that there are two species of *Bibos* in the Chota Nagpore territories *alone*! Doubtless close investigation will reveal many new species in the Bovinæ.

(2692) *Genus BISON.*

Yak. Chouri Gau.

Cranium moderate, depressed, with the facial portion exceeding the frontal and cerebral parts.

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Frontals broader than long, convex and forming an obtuse angle with the occipital plane.

Occipital plane smaller than the frontal plane, trigonal or semi circular, and ridged by the parietes.

Orbits salient.

Condyles of great foramen and of lower jaw low, and jaw straight. Horns attached below the curved or bent intercornal ridge, rounded and curving out of the horizontal line.

Ribs 14 or 15 pairs.

A true dorsal ridge, confined to the withers.

Muscle small.

Dewlap none.

Types Americanus et Pœphagus.

The latter is the Yak or Chouri Gau.

It inhabits all the loftiest plateaux of High Asia between the Altai and the Himalaya, the Belut Tag and the Peling mountains, and is found wild as well as tame. It cannot live on this side the Himalayas beyond the immediate vicinity of the snows, where the tribes of the Cachar or Juxta-nivean region of the sub-Himalayas rear large herds and cross-breed with the common Ox. The yak ruts in winter and produces young in autumn, after the usual period of Bovine gestation. Small intestines 197 feet. Large  $33\frac{1}{2}$  feet. Cœcum  $2\frac{1}{2}$  feet. Width of small gut  $1\frac{1}{2}$  inches; of great, 2 inches; of Cœcum 4 inches. Cœcum simple, that is not saccæd nor banded.

(2693) *Genus* BUBALUS.

Bhainsa. Arna.

Cranium large, elongate, compressed, exhibiting great excess in the facial over the frontal and cerebral portions. Frontals short, narrow-convex, forming an obtuse angle with the occipital plane.

Occipital plane larger than the frontals, spheroidal, moderately indented.

Condyles of the foramen and lower jaw low and the jaw little curved. Horns attached to the highest line of frontals, depressed, angular, and horizontal.

Thirteen pairs of ribs.

No true dorsal ridge nor hump.

Muscle very large and square.

Dewlap medial.

Types. Bubalus Buffelus, or the Bhainsa, and Bubalus Arna or the Arna. [Bornouensis and Brachycerus are to my mind no Buffaloes, and their united horns form a character at variance not only with the genus but the family. Hence I denominate them from this feature Syncerus. They are foreign to India, the land of the true Buffaloes.]

Habitat of the tame, universal; of the wild, also every place where adequate cover and swamp exist. The haunts of the Arna or wild Buffaloe are the margins rather than the interior primeval forests. They never ascend the mountains, and adhere, like Rhinoceroses, to the most swampy sites of the district they frequent. There is no

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animal upon which ages of domestication have made so small an impression as upon the Buffaloe, the tame species being still most clearly referable to the wild ones at present frequenting all the great swampy jungles of India. But in those wildernesses as in the cow houses, a marked distinction may be observed between the long-horned and curve-horned Buffaloes, or the Macrocerus and Spirocerus of my catalogue—which whether they be separate species or merely varieties, I shall not venture to decide, but incline to regard them as species. The length of the horns of Macrocerus is sometimes truly enormous, or  $6\frac{1}{2}$  feet each.

There is such a pair in the British Museum, and another pair I saw in Tirhut. The Arna ruts in autumn and the females produce one or two young in summer after a gestation of 10 months. The herds are usually numerous and sometimes exceedingly so, though at the season of love the most lusty males lead off and appropriate several females with which they form small herds for the time. I have no memorandum of the intestines of the Arna. This noble species is, in the Saul forest and Tarai, a truly stupendous animal, as tall as the Gaur and longer considerably and of such power and vigour as by his charge frequently to prostrate a well sized elephant! The wild animals are fully a third larger than the largest tame breed, and measure from snout to vent  $10\frac{1}{2}$  feet, and six to six and half feet high at the shoulder. The wild Buffaloe is remarkable for the uniform shortness of its tail, which extends not lower than the hock; for the tufts which cover his forehead and knees, and, lastly, for the great size of his horns and the uniform high condition of the animal, so unlike the leanness and angularity of the domestic buffaloes' figure, even at its best.

I have now disposed of all the Bovines proper of India, and might next proceed to the Bovine Antelopes or Busdorcinae which form another sub-family of the Bovidae. But those animals, with one exception, and that a doubtful one, viz. *Portax picta* or the Nilgau—are wholly foreign to India, and the Nilgau itself rarely found on the left bank of the Ganges, how common soever across that river all the way to the Deccan Carnatic. Wherefore, having no personal knowledge of the group, I leave it untouched. It will be seen above that my principle of generic classification is organic. I assume that *every* organic variation is a sign of genus, that *nothing but* organic variation is a sign of genus; that we are too ignorant at present of the real nature and use of most organs to decide on their relative value and to reject some because they seem comparatively uninfluential on the habits and economy of the animal endowed with them; that the organ is always, the datum; its use always the desideratum, and that all organs ought to be prominently set forth until their structures, uses, and relative impor-



## SACCHARUM VIOLACEUM.

tance be decided on; that all three sorts of teeth are organs, and all therefore are properly introduced to mark genera and even higher groups; that there is *not* the entire uniformity of dentition among the Ruminants which has been so long asserted; and, lastly, that the special form of the horns in the Cervidæ, though not strictly an organic mark, may yet be wisely used at present to help the indication of genera, because it is a very palpable sign, and one besides usually harmonising with, and indicative of other and organic modifications yet partially or wholly understood. [Note. Mr Hodgson's correction of an oversight in the description of Genus Axis, page 991, reached us after the sheet has been printed off. For "canines in males only," read "canines in both sexes" Eds.]

(2694) RUMZAN, the ninth month of the

## SAGO OF THE INDIAN ARCHIPELAGO.

Mahomedan year, during which these religionists fast from sunrise to sunset. Breakfast is from 2 to 4; and during the fast, eating, drinking, and conjugal embraces are interdicted, as also chewing betel leaves, smoking and snuffing.—*Herkl.*

(2695) RUTICILLA ERYTHROGASTRA, Guld., V. R. Tricolor, Gould; a specimen of this fine and very rare Himalayan bird was obtained by a mountain stream near Landour,—there were a pair of them, apparently alike in colour.

(2696) RUT JUGGA. *Hind*, Nocturnal vigils, a mahomedan ceremonial on several occasions.—*Herkl.*

(2697) RYAN. *Arab*. According to Mahomedanism, one of the eight gates of Heaven.

## S.

(2698) SABU-THA-BEY, Burmese, is one of the largest of trees of Burmah. Fruit, size of a small peach, red, very many seeds, hanging in clusters from the trunk Malcom, V. 1. p. 179.

(2699) SACCHARUM MUNJA, is manufactured in Bengal, into strong ropes, for tying up cattle, and drawing water.

(2700) SACCHARUM SEMI-DECUMBENS.

*The plant.*

Tat also Neja, *HIND*.

<i>The grass.</i>	<i>The Culm.</i>
Mora, <i>HIND</i> .	Kelick, <i>HIND</i> .

The culms are used for screens and pens.

(2701) SACCHARUM VIOLACEUM. Otaheite Sugarcane.

Eek, <i>HIND</i> .	Rickhoo, <i>HIND</i> .
Kusbass, „	Poona, „
Shukur, „	Ponda, „
Ghunna, „	

The Otaheite sugarcane is now abundantly cultivated in the Saharunpore district; but, though it gives a larger per centage of sugar it is objected to by the natives as being too strong for the pressure of the native mill: it is therefore principally cultivated for eating. In the Deyrah Dhoon it has been extensively cultivated for making sugar, and that too with much advantage, but it is there pressed with European mills.

(2702) SAGO OF THE INDIAN ARCHIPELAGO. In most parts of the Indian Archipelago two kinds of alluvial soil are found in greater or less abundance, one consisting chiefly of sand often thrown up in long banks, and the other chiefly of decomposed vegetable matter. The latter is often a consequence of the production of the former, which serves to keep out the waves of the sea, and allow a rank vegetation to flourish. In process of time, by the elevation of the surface and the extension of a similar formation seaward, the older marshes are no longer subject to tidal invasion, and become gradually filled up by the decay of fresh water plants. For these two descriptions of soil nature has provided two kinds of palm adapted in a wonderful manner to the necessities of man. On the barren sand she has planted the cocoanut, and in the morass the sago tree.

The following paper is composed chiefly—1st, of an account of the mode of cultivating and using the sago in the Moluccas translated from Dutch of M. de Steur's (Tijdschrift. Neer I., Ind. 8th year, 3d. part p. 367) adding to it some notices from Valentyn and Forrest. 2d, of an account of the cultivation of sago in Sumatra and the earlier statistics of its manufacture in Singapore, extracted from a paper in one of the early numbers of the Singapore Chronicle. To these we have added, 3rd, an account of the mode of preparing the Pearl Sago of commerce by the

Chinese manufacturers of Singapore at the present day and of the Singapore sago trade.]

- It is to the latter that we wish to direct attention, because along the immense alluvial tract of the Sumatra coast from Siak to the Lampongs, and in the large plains of the rivers of the Peninsula such as those of Rio, Formosa and the Muar, there are hundreds of miles of sago land unoccupied and unproductive, every acre of which is capable of yielding at the rate of about twenty thousand pounds of meal yearly.

The sago tree is found, in one or other of its species, throughout the whole length of the Archipelago, from the islands off the west coast of Sumatra to New Guinea. It is probably capable of flourishing with complete vigour across nearly its entire breadth wherever its natural soil occurs, and certainly within ten degrees north and south of the equator, a band which includes all the Archipelago save the Philippines. The only countries however where it is found growing in large forests are New Guinea, the Moluccas, Celebes, Mindanao, Borneo, and Sumatra, being widely spread over the Moluccas, but confined to particular parts of the others.

The sago does not appear to be indigenous in Sumatra and the Peninsula, which is perhaps the reason why it is titled by the Malays. In the eastern parts of the Archipelago it forms in many places the chief portion of food of the inhabitants. In Singapore we know it principally as an imported article prepared by washing and granulation for the European market. It comes to us chiefly from the adjacent coast of Sumatra and from Borneo, and passes through the hands of Chinese refiners before it is purchased for export to Europe. An account of the production of sago in the eastern and western parts of the Archipelago, the modes in which it is prepared and used by the natives, and the process of purifying and granulating it in Singapore, may help to fix attention on the fact that the Archipelago can furnish any required amount of meal, and that its present high price is owing to the succession of rude manipulations, all attended with wastage and expense, which it unnecessarily undergoes. Instead of being at once carefully washed and cleaned at the place of growth, this work is there performed in a slovenly and in an imperfect manner, but with more labour probably than a thorough purification by a good process would require. It is then packed in small quantities in leafy receptacles and arrives here dirty and sour. The Chinese have now to do the whole work of cleansing over again, with this disadvantage that the farina is no longer fresh. Their process too although far superior to that of the Malays, is imperfect, and involves a considerable waste both of material and labour.

#### *Sago in the Moluccas.*

Amongst all the trees which we have yet mentioned, says Valentyn in his account of the vege-

tation of the Moluccas, there is none more useful to the Amboynese than the sago tree. It shews itself at first, and for a long time afterwards, merely as a bush or shrub, consisting of different upright branches which are about 15 or 16 feet high, green, concave in the inner side, convex on the outer, and smooth. On the lower part of these, long small thorns are seen, which stand in order above each other like needles, the middle being always the longest. The leaves, which are very long and small, stand out on both sides of these branches, are longer, broader, and thinner than those of the cocoanut, and have on the sides soft, erect spines. In due time there rises from this bush a stem, which having reached twice the height of a man, gradually loses its thorns except those above, which also afterwards gradually fall off. The branches which become tolerably thick, have a broad base called gururn, about three feet long and a foot broad, being almost like a gutter which surrounds the stem and the next branch, and decreases to its top. The upper part of the branch is called gabba gabba and is about the thickness of the arm at its top and much thicker below.

As long as the stem is immature, thorny branches at the bottom protect it from the wild hogs who would otherwise fatten on the meal. It gives no fruit until all its strength is expended and its death approaches, and when the branches are strewed with meal, at which time small fruits like round pigeon's eggs shew themselves in great number at its top, like a crown. These are green and when ripe sour, and they finally become yellow.

[Oud en N. O. II. This appears to be *Metroxylon sago*, or *Sagus Konigii*. The following botanical description by Dr. W. Jack, of one of the Sumatra and Malacca species, *Sagus lœvis*, of which the accuracy is confirmed by Dr. Griffith, who adopts it in his paper on the Palms of British East India appeared in the *Malayan Miscellanies* published at Bencoolen:—

This valuable tree rises to the height of about twenty feet, and is generally surrounded by numerous smaller and younger plants which spring up around it after the manner of the Plantain (*Musa sapientum*). The stem, which is about as thick as that of the cocoanut tree, is annulated by the vestiges of the fallen-leaves, and the upper part is commonly invested with their withered sheaths. The leaves resemble those of the Cocoanut, grow more erect, and are much more persistent, so that the foliage has not the same tufted appearance, but has more of the graceful ascending curve of that of the *Saguerns Rumphii*; they are pinnate, unarmed; the leaflets linear, acute, carinate, and smooth. That tree is from fifteen to twenty years in coming to maturity, the fructification then appears, and it soon after decays and dies. The inflorescence is terminal; several spadices rise from the summit of the stem, enve-



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loped in sheaths at their joint; and alternately branched. It is on these branches that the flowers and fruit are produced, and they are generally from five to eight inches in length. They are of a brown colour, and closely imbricated with broad scariose scales, within which is a quantity of dense ferruginous wool, in which the minute flowers are imbedded and completely concealed. Each scale supports two flowers which are hermaphrodite, and scarcely larger than a grain of turnip-seed. The Perianth is six-leaved, of which three are interior, the leaflets nearly equal. Stamina six, filaments very short; anthers belong, two-celled. Ovaria three, connected together in the middle, each monospermous. Style none, stigma small. Fruit single, nearly globular, somewhat depressed at the summit but with a short, acute mucro or point in the centre; it is covered with scales which are imbricated from the top to the bottom, and are shining of a greenish straw-colour, of a rhomboidal shape, and with a longitudinal furrow down their middle. Below the scales the rind is of a spongy consistence; and the fruit contains a single seed, of rather an irregular shape; and having the umbilicus situated laterally a little above the base of the fruit. The progress of the fruit to maturity is very slow; and is said, according to the best information I can obtain, to occupy about three years from the first appearing of the spadices to the final ripening of the fruit. During the period of inflorescence, the branches of the spadix are brown, and apparently quite bare. Afterwards a number of small green knobs appear above the brown scales, which grow enlarging till they at length acquire the size of a small apple. But few fruit come to maturity on each branch.

In habit and character this tree recedes considerably from the true *Palmae*. Its propagation by radicle shoots, exactly in the same manner as the common cultivated Plantain, is peculiar, and is not observed in the true Palms. The terminal inflorescence and death of the tree after fructification is another peculiarity. It is allied to *Calamus* by its retroversely imbricated fruit.

This species of Sago is abundant in many parts of Sumatra and at Malacca, and is employed in the preparation of sago for food. Considerable quantities are made at the Peggy Islands, lying off the west coast of Sumatra, where in fact it forms the principal food of the inhabitants. The sago of Siak is remarkably fine, and is also, I believe, the produce of this species. At the Moluccas the spinous sort is considered superior to this, but I am doubtful whether it exists in Sumatra.

[Note. The Sumatra plantations contain three kinds, one spinous both on the trunk and leaves "rumbia" (*sagus Konigii*); one spinous on the leaves only, "sanka;" and the other without spines "bumban," which appears to be the female sago or

botanists. Valentyn says the meal of the female sago does not keep so long as that of the other species. He mentions 4 and M. de Steurs 5 species. I. R. L.] For making the sago, the tree must be cut before fructification commences, as it then becomes hard and dry.

The sago tree, whose appearance when it has attained its full growth, has much that of the gomuti tree, is cut down at the bottom of the stem. The greater or less adaptation of the ground regulates its speedy or slow development; its full development may however be placed at about 10 or 15 years. The natives know this period from the appearance of the fruit at the top of the tree, and then call the tree *ma a putric*, (ripe). The tree requires very little care in rearing it, only attention must be given that it is not covered by creeping plants, and, that the foot of the trees be kept somewhat clear of high weeds that the growth of young shoots may not be hindered. A full grown tree of good quality may generally be valued at a sum of f. 8 copper, and a medium tree at f. 5 copper. The sago tree being cut down, the mealy substance inside is taken out and prepared for use and transport in the following manner. The stem is cut with a parang into pieces of a fathom in length, which are split through the middle and cut up, and are always carried with great care to a running water. To separate the meal from the shell, the native uses an indigenous adze, "many," which is of the following description; a piece of bambu 3 inches in circumference and 2 feet long, is pierced with a slanting hole in which another piece of bambu like a chisel, and sharpened at the broad end, is stuck and fastened to the other with a string. For the cleaning of the sago, that is to say, to separate the meal from all impurities and woody particles, an apparatus is used called the *satrany*; it consists of the end of a large old sago stem already properly excavated by nature, fitted at the broadest side by means of bambu pegs to a bag of the bark of cocoanut, "runut;" the *satrany* thus provided, is laid upon two wooden forks about 3 or 4 feet high, the open end being considerably higher and placed under a stream of water running very gently from a bambu pipe, while right opposite the other end a long and a very strong stick is stuck in the ground, and bent till its upper extremity is brought down to the level of the runut to which it is fastened. The runut is thus always kept in a state of tension, when the sago meal mixed with water is pressed by the hand against it. The meal passes through the runut, while the coarse matters, (ela,) remain in the sago trough, and serve as food for pigs and poultry. On the ela when thrown aside in heaps a kind of mushroom grows, which forms an agreeable dish; and when the trees rot there also grow in the rotting parts

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Worms with brown heads, which the natives roast on skewers, and devour as a great dainty; but the heads are taken off and then they are eaten by some Dutchmen also. But I cannot say how they taste, for I never had an inclination to try them. [*Note Valentyn.*]

The sago pressed through the satrany is received into the "goti," which also rests on two forks stuck in the ground. The goti is a portion of a split sago trunk, of which both ends are made water tight by sago leaves and the spongy substance of gomuti, or the bark of the kaya puti tree. The goti always receives such a supply of water from its upper extremity that it remains full, and gently overflows at the low end, thus allowing the heavy farina to sink, while any woody particles that have been pressed through the runut are carried off by the water.

This simple operation, called pukul sago or striking the sago, being performed, the farina is taken out of the goti and packed in cylindrical baskets made of sago leaves, ready for exportation. These baskets, which are all nearly of the same size, are named "tumang-sago."

It is worthy of remark that the whole of this native mode of preparing the sago, which comes entirely within the reach and understanding of every inhabitant, was taught to the Amboynese by Rumphius who is so well known to them. Before that time the Amboynese, like the natives at this day at various places on Ceram and Buru, and also elsewhere as on the west coast of Sumatra, used the sago mixed with the ela. The recollection of Rumphius is general amongst the Amboynese, and is accompanied by a true recognition of the value of this most necessary mode of preparing an article of food which nature has so bountifully bestowed.

A good sago tree produces about 25 tumangs of meal, which being sold at from 0.75 to 0.80 k. gives the manufacturer a good profit.

The native of the Moluccas prepares the meal in different ways, chiefly however as a hard bread, which, if kept dry, may be preserved as long as our ship's biscuits, and is called sago "lempong." The meal after having been dried for two or three days is sifted until it becomes tolerably fine but remains somewhat adhesive. It is then formed into small flat cakes which, to the number of 7 or 8, are placed in a mould of red earth and baked to the proper degree.

The *sago bornek* or *Borne* granular sago, is dried for a shorter period, then sifted, and shaken by two men in a piece of cloth until it granulates. It is then smeared with fresh cocoanut oil and heated in an iron pan (tatyau) until it attains a certain degree of hardness, after which it is placed in the sun to dry.

A third mode of preparation is the sago tetupala. The meal is aired until it becomes red, when it is sifted, and stuffed into an entire fresh bambu, which is placed in different rows above

a fire until it bursts and the sago is roasted. Sago thus prepared may be preserved a long time if kept dry.

The fourth mode is the "sago buksona." The meal is mixed with grated santang kalapa, sugar, and a little pepper and salt, enveloped in young sago leaves, and boiled in water.

To make the "sago or kwee bagea," the meal, after being dried in the air to redness, is sifted, mixed with fresh kanari kernels, and then baked in young sago leaves. "Sago baruwa" are small sago cakes of different forms. The "sago sinale" is the meal baked to a cake in a pot. The "sago ulu" is the meal enveloped in fresh sago leaves and baked on the fire. "Sago kalapa," like the lemping, is baked in moulds and mingled with much grated santang kalapa; the outside is smeared with gula areng, and it is eaten warm. Sago kalapa is even preferred by Europeans to bread at breakfast, and ranked as a dainty. "Pap-peda," "sago bubur or pap" is prepared in the same way as arrow root.

To proceed to the uses to which the native of Moluccas puts the sago tree over and above extracting from it a wholesome and abundant article of food, we remark that no part of it is lost or suffered to remain unappropriated.

The branches, dried and cut to lengths of 6 to 10 feet and in the state called gaba gaba, soon gain a fine brown, shining colour; the hard shell preserves the spongy interior from destruction when it is not exposed to rain and humidity. The houses are partly and sometimes wholly made of gaba gaba; the best are those of which the frame work is of wood and the sides of gaba gaba. The branches having a concave and a convex side are fastened to each other by small pins, and make as good a wall as planks. Instead of a wall round the yard they also use the gaba gaba, which is made to rest on a low frame work or foundation of stone, and is protected above, by a little atap copping. The gabba gabba placed on a wooden frame work generally lasts from 10 to 15 years.

The leaves of the tree, while still green, are made into ataps, and serve to cover dwellings. When well laid on they last about 7 years. The bark of the tree furnishes a valuable fuel. The stalk of the leaf gives the well known "sapu lidi," like that of the cocoanut and gomuti.

The hard rind or bark of the thicker or lower side of the branch-stem is made into a kind of bucket called gururu, in which the saguwero liquor is collected. From the extremity of the branch, while it is yet very young and green, they prepare a kind of kadas which is used for the sails of native vessels and of orembaais, and also for making the thick and middling sails called ayia ayia. The root of the tree which has been cut down produces new shoots, and is therefore not dug out.

We may remark finally that the Moluccas



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produce five kinds of sago trees, viz. sago-ihar, with all its leaves depending and full of thorns; sago-tuni with horizontal leaves and less thorny; sago-molat, entirely divested of thorns; sago-makanaru, with leaves somewhat bent down, and sago-rottan, like the last, but with a stem much higher than the other kinds.

Forrest and his crew, during the voyage in the Tartar Galley which he has so graphically described, lived much on sago, and his experiences as an actual sago eater in the Moluccas, enable him to speak with all the knowledge and discretion of a farinaceous epicure. The following remarks by him will therefore complete our notices of sago in the Moluccas.

One tree will produce from two to four hundred weight of flour. I have often found large pieces of the sago tree on the sea shore, drifts from other countries. The sago thus steeped in the salt water, had always a sour disagreeable smell; and in this state, I dare say, the wild hogs would not taste it. The leaf of the sago tree makes the best covering for houses, of all the palm kind [Note. Those trees of the palm kind, have all a heart like what is called the cabbage tree; even the head of the common ratan has a small cabbage, of which I have eat.] it will last seven years. Coverings of the nipa [The ordinary leaf for covering so called.] or common attop, such as they use on the south west coast of Sumatra, will not last half the time. When sago trees are cut down, fresh ones sprout up from the roots.

We seldom or never see sago in Europe, but in a granulated state. To bring it into this state from the flour, it must be first moistened, and passed through a sieve into an iron pot (very shallow) held over a fire, which enables it to assume a globular form.

Thus, our grained sago is half baked, and will keep long. The pulp or powder, of which this is made, will also keep long, if preserved from the air, but, if exposed, it presently turns sour.

The Papua oven, for this flour, is made of earthen ware. It is generally nine inches square, and about four deep: it is divided into two equal parts by a partition parallel to its sides. Each of those parts is subdivided into eight or nine, about an inch broad; so the whole contains two rows of cells, about eight or nine in a row. When the cell is broad, the sago cake is not likely to be well baked. I think the best sized cell is such as would contain an ordinary octavo volume upon its edge.

When they are of such a size, the cakes will be properly baked, in the following manner.

The oven is supposed to have at its bottom, a round handle, by which the baker turns the cells downward upon the fire. When sufficiently heated, it is turned with the mouths of the cells up, and then rests upon the handle (which is now become the bottom) as on a stand.

When the oven is heating, the baker is supposed to have prepared his flour, by breaking the lumps small, moistening it with water, if too dry, and passing it once or twice through a sieve, at the same time rejecting any parts that look black or smell sour. This done, he fills the cells with the flour, lays a bit of clean leaf over, and with his finger presses the flour down into the cell, then covers all up with leaves and puts a stone or piece of wood at top, to keep in the heat. In about ten or twelve minutes, this will be sufficiently baked, according to their thickness; and bread thus baked, will keep, I am told, several years. I have kept it twelve months, nor did vermin affect it in that time. It may not be amiss to mix a little salt with the flour.

The sago bread, fresh from the oven, eats just like hot rolls. I grew very fond of it as did both my officers. If the baker hits his time the cakes will be nicely browned on each side. If the heat be too great, the corners of the cakes will melt into a jelly, which, when kept, becomes hard and horny; and, if eat fresh proves insipid. When properly baked, it is in a kind of middle state, between raw and jellied.

A sago cake, when hard, requires to be soaked in water, before it be eaten, it then softens and swells into a curd, like biscuit soaked; but if eat without soaking (unless fresh from the oven) it feels disagreeable, like sand in the mouth.

No wonder then, if agriculture be neglected in a country, where the labour of five men, in felling sago trees, beating the flour, and instantly baking the bread; will maintain a hundred. I must own my crew would have preferred rice; and when my small stock of rice, which I carried from Balambangan, was near expended, I have heard them grumble, and say *manti makan roti Papua*, "we must soon eat Papua bread." But as I took all opportunities of baking it fresh, being almost continually in port, they were very well contented.

The sago bread intended for immediate use, need not be kept so long in the oven as what is intended for sea use, which may be said to resemble biscuit.

I have often reflected how well Dampier, Furnel, Roggewein, and many other circumnavigators might have fared, when passing this way in distress for provisions, had they known where to find the groves of sago trees, with which most islands here in low latitudes abound; Morty, near Gilolo especially. Fresh bread made of sago flour, and the kima (a large shell fish like a cockle) would have been no bad support among the Moluccas. The kima is found in abundance, of all sizes, at low water, during spring tides, on the reefs of coral rocks. From experience, I equal the fresh baked sago bread to our wheat bread; and the kima stewed, is as good as most fish, nor does one tire of it; but it must be

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blew some time, or it will not be tender. Its roe will sometimes weigh six pounds; the fish altogether, when cleared of the shell, weighing twenty or thirty pounds.

The *Sago of Sumatra*. From the Singapore Chronicle.

Low marshy situations shut out, but at no great distance from the sea, and well watered by fresh water seem most productive. The soil in such situations to the depth of several feet is generally a flaccid mould, composed chiefly of decayed vegetable matter and extremely pervious to water, below the above depth a stratum of marine formation generally exists. According to Raffles, in Java this tree is found only in a few low marshy situations, and the preparation of sago from the nature of the soil in the places we have mentioned is very similar, all of them being deep bogs, next to impassable to one unaccustomed to such walking.

Cutting down and burning the jungle is all the preparation required previous to planting the palm, at about 5 fathoms apart, which is best done from the seed, a small black nut, about the size of a pullet's egg.

Plantations have been tried from the suckers, but the injury sustained by their roots in the separation from the parent stem has invariably retarded their growth above a year.

From seven to ten years is the time it takes for the tree to bear fruit, when planted from the seed in the first instance; the pith commences generally at about the age of 6 or 7 years; after this period, it gradually loses its moisture, and is no longer fit for sago when the tree comes into bearing.

Sago is cultivated in large patches, divided into lots the property of individuals, and as much as one man, his wife and family choose to look after: I say choose, because it is not as much as they could if they would attend. One man as above can manage 100 fathoms square, upon this he plants 400 seeds, and subsists himself for the first 6 or 7 years on his means, not unfrequently leaving the trees to take care of themselves, until he can commence the pith is not known to the inhabitants." Marsden says that sago is but little used by the Sumatrans, and Crawford presumes that in this, or the Western part of the Archipelago, the sago palm is an exotic. Our enquiries have been unavailing in the attempt to discover it to be indigenous in our neighbourhood, and we feel confident that it does not exist in the native wild state to the westward of Borneo.

The best sago produced in our vicinity, is from the Islands of Appong and Panjang, which form the East bank of Brewers Straits or properly Salat Panjang, and next in quality, is that from the rivers Mandha, Kataman, Goung Egal, Plandok, and Anak Sirka, lying between the Kampar and Indragiri rivers, on Sumatra, or Pulo Percha,

as it is called by the Malays. Of least value is the produce of the islands of Buru, Ungah, and Kundor, in the straits of Dryon or Salat Duri. The sago palm is found in several other places in small quantities, but is seldom cut down by the lazy possessors of it, to whom it probably descended through a long line of equally sluggish ancestors, from some Inchi of zaman daulu, who had better notions when he planted it. The native commence cutting. From that day the supply is constant, each tree throws out from 10 to 20 suckers, which increase so rapidly that the owner is obliged to thin them constantly. A good tree yields from 40 to 50 tampins, and the worst ever cut down about 25; this is on Appong. The Tampin of Appong is to that of Mandha as 4 is to 5. It is a rough measure made of the leaves of the sago tree of a conical form 20 to 30 inches long with a base of about 8 inches diameter both ends of this are stuffed with the refuse pith to prevent the escape of the farina, and the tampin of Appong holds on an average 19 pounds avoirdupois—thus 7 tampin very nearly equal a picul of this place, or 133½ lbs. avoirdupois.

It will be needless to speak of the sago of each place, differing but a little in quality, and in the measures they are sold by, as the acuteness of the Chinese brings them all to their true level on arrival here. One remark on the stupidity of the cultivators may be made, viz., that 100 tampins of Appong may always be purchased on the spot, cheap or dear at other places it matters not, for 6 l-4 reals or Sp. Drs. 5-12 as a Sp. Dr. or a Real is the same thing with them and both go alike for 244 doits or 82 cents of a Sp. Dr. of Singapore. If the person in quest of sago takes doits, they must be of the small kind, but thick. At Mandha, on the same principle the same number of tampins may be had for Sp. Drs. 9-61. Now the Appong measure yields 14 piculs 29 catties and the Mandha 17 piculs 86 catties; being a difference against Appong of Sp. Drs. 2 51, and all because they say it has been the adat or custom to sell it so.

One person is sufficient to clear the underwood away as it grows up in every lot of 100 fathoms square. The whole family are however fully occupied when they cut down the trees for manufacture which is always done on the spot where the tree is felled. They prepare the number of Tampins or measures required for the reception of the sago in the first instance, and put them out to dry; they then fell the tree, and split it in halves by means of wedges, build a temporary house over it and dig out the pith with hoes made from the rind of the tree. They then carry the pith up into the house; the floor of which is latticed so close as just to allow the finer parts of the medulla to pass through on being wetted with water and trodden by the feet. Into this house the produce of two or three trees



is brought at a time, and all the finer parts are carried down by the water into the trunks of the trees, [Note. A boat is often used.] 3 or 4 feet in diameter which are cleanly hollowed out and left below to receive it. In order that no wastage may take place, they lead a mat, made also of the leaves of the palm, from the floor of the work shop down into the shells of the trees, and this carries the water without spilling any. They trample it until the water passes through clear of the farina, and then throw away the refuse, keeping sufficient merely to stuff the ends of the tampin. By the next day, the medulla has settled in the trunks of the trees, leaving the water at the top; this is drawn off and the sago flour thrown in its wet state into the tampin already prepared, and left to strain itself: some refuse pith is then put on the end, before left open, of the base of the cone, and the work is done. The shell of the tree is cut up for firewood or in slips and thrown into the marsh, to prevent the poor devils going quite overhead in carrying down the sago to the boats waiting for it. This is always their duty, for if the Malays who come to purchase could not get this included in their agreement the chances are they would go elsewhere in search of the sago. Sago once made is obliged to be kept wet or it would spoil in a few days; again, kept constantly wet the tampin leaves soon rot; cultivators cannot therefore keep a stock ready, but at greater risk than these savages choose to undergo. They have a method of frying the meal over the fire called there sago randang, which sells for a real or 82 cents of a sp. dollar, for 16 of their gantongs are equal to 20 of Singapore or one picul. This however will not keep long; as damp throws it all into a glutinous mass and in a short time spoils it, and it may easily be supposed that their situations are not very dry and airy. At Appong the sago is made by Orang Utan or people of the woods, who speak a jargon of Malay, are not Mahometans, and eat the hogs, deer, &c, with which their island abounds. The maritime Malays who visit them for sago, are obliged to be always upon their guard, and not unfrequently wait 2 months for a cargo of a few hundred tampins; if they take money to purchase they get it much quicker, but require additional caution in making advances. There are said to be about 350 souls, and that the produce might be put down at 3,000 piculs a year. Most of these people are dependants of Siak and Campar, the chiefs of the former place practising a system of extortion and rapine enough to induce any other class of people less accustomed to it to desert the place. [We lately found two families on Battam, they had managed to make their escape,—J. R. L.] The cultivators in the other places are Malayas and much superior, though their exports are severally less, and trafficking with them is not so dangerous or uncertain.

Appong has 350 souls employed and could produce 3,000 piculs. This would afford under all the disadvantages at which they sell it Sp. dollars 1,024 per annum a sum quite adequate to the demands for foreign luxuries of people who do not eat rice, and live upon the produce of their woods. The people of Siak were the chief importers of sago into Malacca, whence erroneously it got the name of Siak sago described as the best by Crawford: Siak itself exports no sago.

Malays all agree that the cultivation of sago is the most profitable of agricultural pursuits, not yielding even to the cultivation of rice by Sawas, for once in bearing the trees are ad infinitum equally profitable and require little or no labour.

The miserable state of barbarism in which the cultivators of sago exist, puts all calculations at defiance, but we do not hesitate in saying that if any person would commence here, and there are many places peculiarly favourable to it and of considerable extent, the profits of an English acre when the trees were once fit to cut would amount on a low estimate to 50 pounds sterling per annum after paying all expenses.

This too is a branch of agriculture that an European might engage in without the certainty of being robbed, which pertains to the culture of spices &c.

The maritime Malays, who are almost the sole importers of sago, are enabled generally to realize from 80 to 120 per cent. on their cargoes: they are seldom ten days at sea, and notwithstanding the occasional detentions and annoyances they experience in carrying on this traffic, must, with few exceptions, be well recompensed.

Allowing an absence of two months, in a boat of two coyans, and five men, bringing back four hundred Tampin, they have a clear gain on their return cargo of 17 to 26 dollars according to the state of the market, giving each person a profit as wages, when sago is in demand, of two and a half Spanish Dollars per month, and putting a side 50 cents for wear and tear of the boat, a sum quite adequate for this purpose independent of the preference which people bred up to a sea faring life, generally give to it over all other modes of more profitable subsistence, and setting aside the chance of again which they have on their cargoes imported into the sago districts.

It is curious to contemplate the natural prices fixed by the two classes who cultivate sago. From what we have before stated, it will appear that the rude inhabitants of Appong, by calculation of their wages of labour and profits of stock, on a reduced scale compared with their more civilized and wealthier neighbours, the Malays of Mandha and other places, have contented themselves with an average rate about 30 per cent less, evidently arising from their poverty and barbarous condition.

We have no data from which to compute the

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even probable time at which the sago tree was introduced into our vicinity ; connections have existed for ages amongst the people of this part of the Archipelago, and the Eastern Islands, which though not perhaps purely commercial, were yet sufficient to have brought this about affording at once as it does, a livelihood and subsistence, without the possibility of a scarcity requiring little labour beyond planting the seed, and of all others most easy of attainment and agreeable to the scale of Malayan industry.

The most satisfactory conclusion we can arrive at in the above speculation is, that when or how introduced it matters little, since it will be evident, that of late years only it has acquired any consequence as an article of commerce. It has lain dormant from various causes, among the most evident of which appear to have been the want of purchasers from the grower, even Malays themselves of other parts being formerly afraid to visit them,—the attendant difficulty of getting it to a market, Malacca being the only one except Penang, which previous to the establishment of Singapore was at too great a distance, besides the risk of meeting Pirates on the voyage,—and again, the naturally slothful disposition of cultivators which operated effectually in keeping down the produce, until of late years, when Singapore, in a great measure removing the above obstacles, has created a stimulus to exertion, more probably on the steady increase than the decline, great as the demand now is.

### *Manufacture of Pearl Sago in Singapore, by Chinese.*

The greater number of the Singapore manufactories are placed on the flat ground between the basis of Pearls and Oo Long's hills and the winding and branching creeks and canals of the Singapore river, a situation admirably adapted for them, for the creeks bring the sago boats up to them in front and the hill supplies them from behind with an abundance of pure water. To procure a constant supply, wells are dug on the lower slope of the hill, and the water is led into the manufactories by a succession of wooden troughs having their bottoms lined with clay and which are supported by cross sticks fastened at the place of contact by rattan. The essential features of every manufactory are, the landing place where the sago is taken from the boats, a rude shed where it is removed from the sago leaves in which it is enveloped, a second shed where it is purified, and the large house where it is formed into pearl sago. Besides the tables, furnaces, and bins required for the sago, the latter contains the beds, stools and dining tables of the workmen, and occasionally heaps of boxes. Hitherto it has been an attap shed roughly put together and often only partially closed at the sides. But some of the more wealthy manufactures are now raising substantial edifices of brick

and tile, and it is to be hoped will also introduce into their establishments a little attention to cleanliness and comfort. At present the mass of decomposing vegetable matter which surrounds the sheds produces a sour disagreeable smell. The sago leaves and refuse accumulating in some places for the last 50 years, have there formed extensive beds, spongy at the top and solid below six or seven feet in thickness.

The tampins having been placed in heaps in the shed, the first step is to open them, cast the contents on a plank frame about 12 feet square, surrounded by a rim rising about 2 inches from the surface. The sago, massed together by having remained compressed in the tampin, is here broken up by the common chunkal, a kind of hoe.

The raw sago having been thus made ready for the manufactory, the first process to which it is subjected is that of a thorough washing, without which it would remain impure and coloured. For this purpose strong tubs are employed, about 32 inches deep, 40 inches in diameter at the top and 6 inches more at the bottom ; they are bound by three hoops, each formed of about six thick rattans twisted together. A piece of thin coarse cloth is fastened by its four corners over each tub when used, and hangs loosely into it. The moist sago being poured into this strainer, and there broken and bruised by the hand, is agitated until all its fine particles pass through the cloth and descend to the bottom of the tub, while the fragments of leaf, fibre and other impurities which remain in the cloth, are shaken into a round mass, which is taken up in a bowl and thrown aside. The rapidity and deftness with which this and all the other manipulations are performed are very striking. The sago is next stirred about with an oar for about an hour, after which it is left to stand for about 12 hours, when the water is ladled out, and the sago, which fills about half the tub, is removed to undergo the last purifying process which precedes the granulation. This is performed in a mode at once simple and ingenious, the same principle being availed of which serves the gold and tin miners of the Archipelago to clean the ore ; the more precious matter happening, in all three cases, to be heavier than that with which it is mixed ; and being thus readily separable by the action of running water.

Two tubs are placed at a distance of ten or twelve feet from each other, and connected by two troughs raised by a frame work above them. These troughs are about 10 inches deep, 14 inches broad at the top and 11 at the bottom, one end being closed, and the other open, but having grooves in its sides and bottom, like those of a sluice, into which a series of horizontal pieces of wood or sticks fit, each being about  $\frac{3}{8}$ -ths of an inch in thickness. The end of a piece of cloth of the breadth of the trough being placed over



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the grooves at the bottom, the shortest of the sticks is pressed down upon it, and the cloth, thus fastened, is made to hang down over the edges of the trough into the tub below it. The tub at the other end now receives the sago to about two-thirds of its depth, when it is filled up nearly to the top with water. A man now stirs up a portion of the sago with an oar till the water obtains a milky appearance, when he proceeds to pour it into the troughs. To prevent its falling abruptly, an inclined piece of wood, eight inches broad, is fixed across the trough, so as to leave only a narrow slit between it and the end of the trough. The water is poured on this, descends into the trough, and slowly flowing to the other end deposits a portion of the sago in its progress. The suspended cloth, becoming saturated, serves at once to maintain and equalized the overflow of the water into the tub below it. When the water is poured in, the first waves advance rapidly and carry away much of the sago, but those that succeed deposit the greater part of their more solid contents, transporting into the tub only the lighter fibrous particles which it is the object of this operation to separate from the farina, and by the time the man has performed a similar service at the other trough, and is ready to pour a fresh supply into the first, the water flowing down the cloth has lost its whiteness. This process is continued until the deposit rises nearly to the level of the stick, when the sago next to it, which generally contains some impure sediment, is taken up with the fingers and thrown into the tub. The second stick is now fixed above the first, a fold of the cloth being interposed between them to prevent any liquid sago escaping though the seam, and the operation goes on as before. When the milk in the upper tub begins to grow shallow, it is again filled up with water and more sago stirred up and mixed with it. During the interval and at other more prolonged interruptions the water in the troughs has sometimes time to deposit all its contents, the last being a fine fibrous matter which, if not removed, would leave a thin yellow layer. The surface is washed with the hand until this layer is effaced and held in suspension. When the troughs have been gradually filled up in the manner described, by succession of deposits, and the wall built up to the top by the last stick, the sago is left to consolidate for 12 or 14 hours. The farina which passes out of the troughs in the current is afterwards thrown into one of the tubs whose contents are to be washed and deposited in their turn, and some of it may even be destined to pass through the process many times before it sinks in the trough.

In order to give it the degree of dryness required, it is removed from the troughs and exposed for one day to the sun in lumps about a cubic foot in size, which are placed on tables standing

in the open air. Large kajangs [Note. Mats made of the leaf of the mangkwang.] are kept in readiness to cover it when a shower of rain falls. It is next carried to the large shed where it is thrown in a heap on a long table and broken down into a pulverulent state. It then passes through an oblong sieve, 30 inches by 20 inches, of which the bottom is formed of paralld fibres from the stem of the cocoanut leaf, kept in their positions by strings which cross them at distances of about 2 inches. The lumps which do not pass through the long interstices between the fibres are thrown back into the heap.

The granulation or pearling now takes place. The sifted sago is placed in a cloth of which the ends are tied to a long stick and which is kept expanded in a bagshape by a short cross stick. A horizontal vibratory motion is given to this, the whole mass being kept in constant agitation, and every part successively driven along the sides of the bag. [Note. Some experience is required in drying the sago to the proper degree preparatory to granulation. If under dried or over dried it will not granulate.] This lasts for about a minute, when the new granular sago is again passed through a sieve similar to the preceding one, but the smaller grains which pass through are those which are now rejected. Those that remain are transferred to a circular sieve, of which the bottom is formed of fine stripes of bambu crossing each other. The grains that pass through the square holes thus produced form the pearl sago of commerce in the unroasted state. Those that are larger than the holes are thrown back into the heap to run through the same course again. To assist the men the oblong sieves and the granulating bag are sometimes suspended by rattans from the rafters of the shed.

The roasting takes place in a row of iron pans, each about  $2\frac{1}{2}$  feet in diameter, which are built into a platform of masonry about 15 feet long and 4 feet in breadth, covered with flat tiles. The pans rest in an inclined position partly against the back of the platform which rises about a foot above its level, and partly on a small prop of brick work on the right side, an offshoot from the wall. Into the top of this prop a plate is sunk in which a cloth saturated with wood oil [Minia krueng,] is kept. Behind each pan is an open furnace mouth, and a man constantly attends to the fires, keeping them supplied with a few billets of bakauwood, and regulating them with a long two pronged iron fork so as to maintain a moderate heat. The pan being gently rubbed with the cloth a man who sits in front of it on a low stool placed on the platform pours into it a quantity of granular sago. This he slowly stirs for a short time with a wooden implement called "weah" having a sharp curved edge. More sago is poured in until it amounts to about two chupas, when as it hardens he uses the weah more freely.

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After about three minutes roasting, it is removed to a table and passed through a round sieve similar to that before described. The grains that adhere to each other are thrown aside, and those that pass through form a smoking heap which is allowed to lie undisturbed for about 12 hours. The grains are about the same size as they were before roasting, and some retain wholly or partially their white and mealy appearance, but the greater part having become translucent and glutinous, and all have acquired a certain degree of toughness, although still soft. [This change appears to be brought about in this way. The water contained in the granules being heated first converts the mealy starch into a jelly and then escapes by evaporation, leaving the jelly tough. The second trefaction drives out the remainder of the water.]

The final process is another roasting, which renders them hard and tough, and greatly reduces their size. The pearl sago thus prepared and fit for exportation, is put away in large open bins ready to be transferred to boxes or bags when sold.

The method of making pearl sago which we have described appears to have undergone no improvement or change whatever since it was introduced into Singapore in 1819. One of the oldest manufactories informs us that it was taught to the first Chinese who tried it here, by a woman who came from Bukit Batu, a place on the coast of Siak facing the large island of Bencolin, and famous for its great fishery of the trubu, the roe of which is so extensively used. We should rather have supposed that it was introduced into Singapore from Malacca, where manufactories had existed for many years before the establishment of Singapore. It is certain however that Malacca derived the art from Bukit Batu, where it originated about the beginning of this century. It was long kept secret, - but in Singapore it appears almost from the first to have been conducted without any attempt at concealment.

From 20 to 30 men are employed in the larger manufactories, but if their labours were confined to the making of pearl sago, 16 men would suffice for a manufactory such as we have described above, and they would produce about 450 piculs per month. Their wages are, for the roasters and the man at the troughs 4 dollars, and for the other men  $2\frac{1}{2}$  to 3 dollars a month, and they receive their food besides. The original outlay is probably from 300 to 400 dollars. The profit of course varies greatly; and the business cannot be so certainly lucrative as has been sometimes supposed, since there have been instances of failures. There are at present fifteen Chinese manufactories in Singapore, and two have recently been commenced by Europeans. We doubt their being able to compete successfully with Chinese, unless they can introduce a more perfect washing

and granulating process, that adapted at present requiring so much labour, and being attended with so much waste, that unless the full work be got from the Chinese employed, there will be little room for profit. The Chinese method of preventing all loss of labour which they carry into most of their undertakings is brought into the sago concerns also. One of the principal shareholders lives in the manufactory, and the best workmen have small shares in the profits besides their wages.

*The Trade in Sago.* We have seen that a large portion of the sago imported into Singapore is the produce of the marshes of Siac and Indragiri, the low island of Rantan containing the most extensive plantations. It is purchased in Siac from the Malays and Orang Sakai by Malays, chiefly of Siac and Singapore, who resort there in small boats for the purpose. In their hands its cost is enormously enhanced, the Sakai selling it to them at about 10 cents per picul, and they selling it to the Singapore manufacturers at from 70 cents to one dollar per picul. [Note. The plantations belong to Malays who employ the Sakai as serfs in planting them and preparing the sago, allowing them one half of the produce. On this and wild animals they subsist, and the sago which they do not require they dispose of to Malays in barter for cloth, tobacco, &c. The Malays admit that by this mode of dealing the sago does not cost them much more than 10 cents per picul. This entirely agrees with the system adopted in their dealings with the Binua of Johore—*Jour. Ind. Arch.* Vol. 1.] The Malays at the Siak islands, and at the sago plantations between Kampar and Indragiri where they have no serfs, sell the sago on the spot at about 20 cents per picul. The price obtained by the latter for pearl sago was at first 6 dollars per picul. The Singapore Manufacturers having succeeded in improving its quality by a more careful manufacture, and the demand increasing for export to Europe, the price rose in 1824 to 7 dollars. This caused the establishment of several new manufactories towards the end of that year which at once brought it down to  $5\frac{1}{2}$  to  $6\frac{1}{2}$  dollars. In 1825 the supply exceeded the demand and two of the principal manufactories, one of which had employed 55 men, were abandoned, and the price fell to 4 to 5 dollars. In 1826 it descended to  $3\frac{1}{2}$  dollars to 4 dollars, and by 1831 it was  $2\frac{1}{4}$  to  $2\frac{1}{2}$  dollars. In 1838 it was so low as dollar  $1\frac{1}{4}$  to  $1\frac{1}{2}$ . After this it rose again. In 1845 it was about 3 dollars. It is now about 2 dollars 65 cents, and has for several years remained between 2 and 3 dollars.

The importations during the earlier years of the Settlement were as follows:—

1819—22 boats, quantity not ascertained,  
1820—5,684 piculs.



# SAGO OF THE INDIAN ARCHIPELAGO.

1821—10,694.  
1822—11,445.  
1823—no imports.  
1824—11,669.  
1825—25,612.  
1826—21,666.  
1826-27—17,768.  
1827-28—16,205.  
1828-29—15,818.

The following tables, for which we are indebted to the honorable the Resident Councillor, will shew the state of the trade for the last 5 years as far as the records of the Office of Registry of exports and imports can be relied on, having been carefully prepared by the indefatigable Deputy Registrar, Mr. Holloway. The average of the exports for that period is about 16,000 piculs of sago flour and 24,000 piculs of pearl sago, or a total annual export of 40,000 piculs, of the value on the spot, at present prices, of 160,000 dollars:—

## I. Imports of Sago during the official years, 1847-48.

### RAW SAGO.

	1847-48.	
	Piculs.	Bundles.
From Borneo, ... ..	33,652 <sup>3</sup> / <sub>4</sub>	279,954
„ Cochin China, ... ..	30	...
„ Sumatra, ... ..	...	266,160
„ Java, R. B. L. & Sombawa, ...	...	300
„ Malacca and Pinang, ...	...	2,250
„ Celebes, ... ..	880	...
„ Other Islands & Places.	540	151,553
	35,102 <sup>3</sup> / <sub>4</sub>	700,217

### PEARL SAGO.

From other Islands & Places.	1,573	...
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## II. Exports of Sago during the official years, 1847-48.

	Sago Pearl.	Sago Flour.
	Piculs.	Piculs.
To Calcutta, ... ..	1,595	...
To Malacca and Pinang, ... ..	1,256	13
To New South Wales, ... ..	758 <sup>24</sup> / <sub>100</sub>	1,333
To United Kingdom, ... ..	14,570 <sup>71</sup> / <sub>100</sub>	37,577 <sup>46</sup> / <sub>100</sub>
To Malabar Coast, ... ..	1,934	...
To China, ... ..	240	...
To Borneo, ... ..	12	...
To Java, R. B. L. and Sombawa, ...	40	...
To Maulmain, ... ..	31	...
To Other Islands and Places, ...	4	5
To France, ... ..	105 <sup>18</sup> / <sub>100</sub>	...
To North America, ... ..	740	...
To Ceylon, ... ..	132	22 <sup>50</sup> / <sub>100</sub>
To Coromandel Coast, ... ..	1,507 <sup>1</sup> / <sub>100</sub>	...
To Cape of Good Hope, ... ..	127	...
To Bremen including Hamburg, ...	3,805 <sup>47</sup> / <sub>100</sub>	195
To Manila, ... ..	592 <sup>84</sup> / <sub>100</sub>	...
To Cochin China, ... ..	15	10
To Mauritius, ... ..	30	...
To Denmark, ... ..	1,212	268
To Malayan Peninsula, ... ..	14	...
	28,721 <sup>91</sup> / <sub>100</sub>	38,103 <sup>54</sup> / <sub>100</sub>

## III. Imports of Sago during the last five official years.

### RAW SAGO.

	1842-43	1843-44	1844-45	1845-46	1846-47
	Bundles.	Bundles.	Bundles.	Bundles.	Piculs.
From Neighbouring Islands, ... ..	16,430	24,450	45,122	114,728	...
„ Borneo, ... ..	134,500	119,820	339,000	180,400	...
„ Sumatra, ... ..	201,910	176,910	232,200	193,070	...
„ Rhio, ... ..	...	700	360	...	1,300
„ E. C. Peninsula, ... ..	...	...	1,150	5,300	...
„ Celebes, ... ..	...	...	...	...	...
„ Malacca, ... ..	...	...	...	...	...
	352,840	321,440	616,722	495,507	1,300

### PEARL SAGO.

	1842-43	1843-44	1844-45	1845-46	1846-47
	Piculs.	Piculs.	Piculs.	Piculs.	Piculs.
From Pinang, ... ..	100	...	...	...	...
„ Malacca, ... ..	50	...	...	...	...
„ Neighbouring Islands, ... ..	710	980	1,567	126	1,237 <sup>1</sup> / <sub>2</sub>
„ Borneo, ... ..	555	640	400	...	1,100
„ Rhio, ... ..	...	...	...	...	280
	1,415	1,620	1,967	126	2,617 <sup>1</sup> / <sub>2</sub>

## IV. Exports of Sago during the last five years.

### SAGO FLOUR.

	1842-43	1843-44	1844-45	1845-46	1846-47
	Piculs.	Piculs.	Piculs.	Piculs.	Piculs.
To Pinang, ... ..	20	...	...	10	...
To Great Britain, ... ..	3,813	13,697	3,401	23,765	8,985 <sup>08</sup> / <sub>100</sub>
To Mauritius, ... ..	12	...	...	7	10
To Foreign Europe, ... ..	578	370	150	135	...
To China, ... ..	...	...	2,000	49	...
To Malacca, ... ..	...	...	6	38	...
To Manila, ... ..	...	...	...	50	...
To Java, ... ..	...	...	...	545	30
To Calcutta, ... ..	...	...	...	18	...
	4,423	14,067	5,551	24,510	9,025 <sup>08</sup> / <sub>100</sub>

# SAGO OF THE INDIAN ARCHIPELAGO.

## PEARL SAGO.

	1842-43	1843-44	1844-45	1845-46	1846-47
	Piculs.	Piculs.	Piculs.	Piculs.	Piculs.
To Pinang, .....	415	439	81	208	766
To Calcutta, .....	311	1,065	1,198	2,170	2,021-71
To Great Britain, .....	18,658	8,541	8,563	12,460	30,732-18
To Mauritius, .....	439	117	307	345	70
To Manila, .....	337	110	415	249	538
To Foreign Europe, .....	2,713	2,213	4,016	2,734	2,900-21
To United States, .....	693	...	370	251	476-36
To China, .....	248	605	219	459	629
To Java, .....	954	123	27	62	5
To Madras, .....	160	200	175	535	636
To Ceylon, .....	11	25	50	1654	133
To Bombay, .....	144	189	954	105	807-74
To Malacca, .....	20	...	26	7	35
To Siam, .....	200	...	...	...	227
To Coc in China, .....	...	100	...	...	45
To East Coast Peninsula, .....	...	...	5	...	10
To Arabia, .....	...	...	17	...	...
To Neighbouring Islands, .....	...	...	5	...	...
To Rangoon, .....	...	...	...	20	...
To New South Wales, .....	...	...	...	...	620-66
To Cape of Good Hope, .....	...	...	...	...	53
	25,306	13,827	16,428	19,758	40,764-86

## RAW SAGO.

					Bundles.
To Borneo, .....	...	...	...	...	100

Low as the price of sago has fallen, we need hardly point out, after all the data which we have placed before our readers, that it is still much above its natural amount. It is not an article which can ever displace the cereals, or which we could wish to be anywhere substituted for them, but it ought to be produced in an exportable state at such a price as to be within reach of the poorer classes, whenever a diminution in the supplies of rice or corn deprives them of a sufficient quantity of their ordinary food. This could easily be accomplished by Europeans possessed of a little mechanical skill, who would combine manufactories and plantations, and thus save the present enormous waste of labour and raw material, 25 cents per picul seems to be about the natural price of sago flour properly prepared at the plantation for exportation, and this is nearly equivalent to 10 pounds for a penny. We have seen that at present the poor Sakai get only about a half penny for that quantity.

Singapore itself is well adapted for sago. There are considerable tracts of marshy land at present lying waste, in all of which sago would grow well, for it is in the very same kind of soil that it flourishes in the neighbouring islands along the Sumatra coast. Arrow and other roots yielding starch are now cultivated with profit, and as one manufactory will serve for the preparation of all the varieties of farina, it would be found advantageous to unite the culture of these roots with that of sago. As all the marsh vallies in the island are bounded by low hill ranges, tracts of land adapted for the purpose could readily be selected.

*Note on the mode of growth and productiveness of the sago tree.* The notices in the above paper of the mode in which the sago tree extends itself not being so definite as could be desired, we visited three groups of sago, one on a moist clay soil at the foot of Syed Ally's hill, and the others in a soft vegetable soil behind the village of Kallang. The first is a dense, impenetrable thicket of sago plants, each of which rises directly from the ground. Three stems ascend above the mass of leaves, a few younger plants send up leaves about 15 feet high from stoles about a foot in breadth, and the whole space between them is filled with younger shoots as close to each other as they can grow. The Kallang trees present a different aspect, owing to the soft, loose soil. The largest of the two groups is evidently of considerable age, and is in reality one connected tree. From a central point six thick roots spring which spread along the ground in different directions to the distance of 6 to 8 feet, when they bend upwards and rise into trees. From these trunk-like roots numerous rootlets descend into the soil, while large branch roots strike out laterally from which other trees rise. At present there are 4 large stems, and 14 young trees of different sizes rising between them and sending up lofty leaves, but without any stem. Around the stole of each of those a great number of shoots are constantly springing, each capable of becoming a tree if it had room. The hollow bases of some trunks which have been cut down are seen. The growing stems are about 16 inches in diameter and covered with moss and small ferns. About the middle of the space covered by this multiplex tree no shoots rise, the oldest parts of the roots appearing to lose their productive power.

The other trees is younger, the large roots having only extended 3 or 4 feet from the centre and still preserving their full vigour throughout, for while each has a tree rising from its extremity, a thick growth of shoots extends along both its sides.

Forrest states the average produce of a Molucca tree to be 336 pounds, but Rumphius makes it from 600 to 800 pounds, and according to the writer in the 'Singapore Chronicle,' who seems to have paid great attention to the subject, good Sumatra trees yield from 760 to 950 pounds, and the very worst 475. Perhaps therefore 700 pounds may be assumed as an average for the Sumatra trees, which at 10 feet apart (the distance stated by Forrest and followed by Crawford would give about 200,000 pounds for the harvest from one acre, and, allowing that the harvests are 15 years apart, and not seven as Forrest assumes, this will give an annual average produce of about 20,000 pounds. We believe however that 5 or 6 feet is about the average distance of the large stems in the Sumatra forests. When a plantation has once arrived



## SAL-GIRIH.

at maturity there will be a constant harvest, because the natural mode of growth secures a continual succession of new plants from the time those first planted have begun to extend their roots, and, this succession can be regulated by the knife in any way the planter desires. The sago tree when cut down and the top severed from it, is a cylinder about 20 inches in diameter and 15 to 20 feet in height. If we assume 20 inches by 15 feet to be an average size, the contents will be nearly 26 bushels, and allowing one-half for woody fibre there will remain 13 bushels of starch, which agrees very closely with our previous calculation, 700 pounds being equivalent to  $1\frac{1}{2}$  bushels. It may give some idea of the enormous rate of this produce, if it be considered that three trees yield more nutritive matter than an acre of wheat, and six trees more than an acre of potatoes. An acre of sago, if cut down at one harvest, will yield 5,220 bushels or as much as 163 acres of wheat, so that, according as we allow 7 or 15 years for the growth of a tree, an acre of sago is equal in annual produce to 23 or 10 acres of wheat.—*Jour. of the Indi. Archi. Vol. III. No. V., May, 1849. page from 288 to 313.*

(2703) SAKI MATI. The coarse kind of barilla (*Saji mati*) to which Dr. Royle alludes, p. 319, as the produce of the incineration of some unknown plants, is a mineral product very abundant near Monghyr and in the Dooab.—*O'Shaughnessy, page 525.*

(2704) SAKUNTALA, name of a Sanscrit Book.

(2705) SAKYA TRIBES, OR SACÆ. The epoch of Sakya (the fifth Buddha or Gautama) is determined by concurrent testimony of the Ceylonese, Siamese, Pegu, Burmese and Chinese eras, which are all founded on the birth or death of the Buddha legislator, and though all differing more or less, concur in placing him between the limits of 544 and 638 years before Christ. The Raj Guru of Asam, a pandit well versed in Buddha literature, fixes the Nirwan or emancipation of Sakya Muni in 520 B. C.

According to Mr. Cosma de Koros, the name of Kanishka occurs in a Tibetan work as a celebrated king who reigned in Northern India, at Kapila, which is supposed to be in Rohilkund or near Hurdwar. His reign dates about 400 years after Sakya (about the end of the second century) when the followers of the Buddha religion had become divided into eighteen sects (the Sakya tribes, or Sacæ) under four principal divisions, of which the names both Sanscrit and Tibetan are on record.—*Prin. Ind. Ant. Vol. I. p. 39.*

(2706) SAL-GIRIH. PERS, or Burrus-ganth, Hind. the anniversary of a person's birth on which a knot is added on a string kept for the purpose.

## SALT.

A girl's years are numbered by a silver loop or ring being added yearly to the gurdonee or silver neck ring.—*Herkl.*

(2707) SALIGRAMS are fossil ammonites obtained from Northern India. The saligram is held in high estimation by Hindoos. Mr. Colebrook, in the 'Asiatic Researches,' vol. vii. page 241, says that these stones are found in a part of the Gunduk river, within the limits of Nepal. Major More, in his 'Hindoo Pantheon,' says they are black, mostly roundish and commonly perforated in one or more places by worms, or, as the Hindoos believe, by Vishnoo, in the shape of a reptile. Others are violet and oval. The possessor of a saligramu, observes the same gentleman, "preserves it in a clean cloth; it is frequently perfumed and bathed, and the water thereby acquiring virtue is drunk and prized for its sin-expelling property." It is always placed near persons when they are about to die.

(2708) SALIX BABYLONICA. Weeping willow.

Mujnoo, HIND.

(2709) SALIX ÆGYPTIACA.

Bed Mooshk, HIND.

From the flowers of this willow the Natives of Northern India, make a kind of sherbet, which is much drunk by them in the warm weather.

(2710) SALIX TETRASPERMA.

Bhynsh, HIND.

(2711) SALMALIA MALABARICA. Pooleo Marum, Tamil. Common about Nelumbore in Wynaad where it is used for building.—*McIvor. M. G.*

(2712) SALT. A brine spring exists at Dyhunda, North Berar, from which salt is manufactured. There are also salt springs near Prome, in Pegu, from which salt is made. In Bellary salt is manufactured from saline earth in the same way as saltpetre is procured; only in the salt manufacture the water is not boiled. It is extensively consumed in the district, though the people prefer sea Salt, the greater cost of which is however a bar to its use.—*Cat. Mad. Ex. of 1857.*

Salt is extracted from the saline soils of several parts of India and used as a condiment. The Natives of the Bellary and Cuddapah districts of the Peninsula, and those of Ghazipoor in the villages of Tuttalapore, Ratouly, Sahory, Chilar and Becompoor all in this way obtain a useful condiment.

Bengal. The supply of salt in Bengal is provided partly by manufacture, conducted on account of the Government. The manufacture is carried on, not by hired labour on the part of the Government, but by a system of pecuniary advances; the parties receiving them, being bound to deliver, at a fixed price, all the salt manufacture. Probably 100,000 labourers (called

## SALT.

molunghees) are engaged in the manufacture in the Sunderbunds. Partly also by importation, and in one instance as with Mr. Prinsep's salt-works at Narriarpore, partly by private manufacture, under a system of excise. The duty is levied at the time of the clearance of the salt from the bonded warehouses. On all imported salt the duty is two and a half rupees per maund of 82 lbs., or about three farthings per lb. The same rate of duty is levied as excise on salt manufactured by private individuals; and the Government salt may be purchased at all times in quantities of not less than 50 maunds, at a fixed price, which is composed of the cost price, with the addition of two and a half rupees per maund, or three farthings per lb. The salt agencies are located along the head of the Bay of Bengal, viz., at Hidglee, Tumlook, Chittagong, Arracan, Cuttack, Ballasore, Khoredah. The average cost price of production is about Rs. 80 per 100 maunds, or a trifle below one farthing per lb., thus making the government selling price under a penny per lb. The supply of salt is no longer a monopoly; its manufacture and sale have not been relinquished by Government, but individuals participate in its provision, both by importation and manufacture, under a combined system of customs and excise.

The system of *fixed prices* and *open warehouses*, commenced in 1836-37, when the previous system of *fixed quantities* and *periodical sales* was abolished, [as recommended by the Select Committee of the house of Commons in 1836.]

Maunds of 82 lbs.

During the seven years commencing with 1837-38 and ending with 1843-44 the duty on salt was Rs. 3-4 as. per maund. The annual average quantity of salt sold and imported during that period was.....	4,627,030
In November, 1844, the duty was reduced to Rs. 3 per maund, and the annual average sale increased to .....	4,966,917
In April, 1847, the duty was further reduced to Rs. 2-12 as. per maund, and the annual sale amounted to.....	5,452,900
In April, 1849, the duty was again subjected to reduction, when it was fixed for five years at its present rate of Rs. 2-8 as. per maund.	

It will thus be seen that in the five years above adverted to, the reduction effected in the salt tax amounted to nearly 25 per cent.; but it would appear that no further reduction can, for the present, be expected consistently with the maintenance of the revenue, the last reduction in 1849 having led to no further increase of consumption.

## SALT.

## NORTH-WESTERN PROVINCES.

The supply of salt to the North-West Provinces is furnished partly from the lower provinces of Bengal, and partly from the Sambhur Salt Lake, in Rajpootana, and other localities on the western side of India. The salt of Bengal having paid the excise or import duty of Rs. 2 as. 8 per maund, passes free into the North-West Provinces. The Sambhur and other salt, on crossing the north-western frontier customs line, is subjected to a duty of two rupees per maund, and to a further duty of half a rupee per maund on transmission to the eastward of Allahabad, thus coming into competition with the salt of Bengal under an equal duty of Rs. 2 as. 8 per maund.

*Madras.* At Madras salt is manufactured on account of Government, and sold for internal consumption at one rupee per maund, or under one farthing per lb. The duty on imported foreign salt was three rupees per maund, but it has been recommended by the home authorities that the import duty should (as in Bengal) be equal only to the difference between the selling price and the cost of manufacture; the difference between the cost price and the price at which the salt is given out for consumption being the duty to be realized.

*Bombay.* In Bombay the manufacture of salt is carried on by individuals, but subject to an excise duty of twelve annas (1s. 6d.) per maund, a similar duty being imposed on imported salt. Salt exported from this presidency to Calcutta is subject to the above excise duty, but credit for that amount is given at Calcutta in the adjustment of the local duty. Facilities are also afforded for the export of salt to Malabar, Travancore, Cochin, and other places.

*Punjab.* The excise duty on salt at the Punjab Salt Mines has been fixed at two rupees per maund.

English salt, it is said, may be laid down at Calcutta at 44s. per ton, or about Rs. 80 per 100 maunds.—*Awbony on Salt Trade.*

But, according to another authority,—Calcutta Review,—Rs. 65 per 100 maunds is the lowest possible rate at which the transaction could be effected. But salt from the Persian Gulf and other Arab States is laid down at Calcutta at Rs. 40 per 100 maunds. It is therefore the high cost of producing Bengal salt (Rs. 80 per 100 maunds) which alone enables English salt to keep a footing in the Calcutta market.

In Bengal, salt is obtained by boiling the seawater.

In Bombay, and Madras, the process is that of solar evaporation.

In the Punjab, it is extracted in a pure state from the Salt Mines.

The Sambhur Salt Lake, in Rajpootana, overflows during the rains, and when the waters subside, a deep incrustation of salt is deposited on its shores for several miles round.

Salt purchased at Calcutta at 1d. per lb., the



## SALT.

Government price, is sold at Benares (400 miles from Calcutta, where it comes into competition with the salt from Rajpootana) at 12 lbs. the rupee, or 2d. per lb.; and, moreover, it is stated to be then considerably adulterated. The consumption of salt in India has been usually estimated [See.—Report of Board of Customs, Salt and Opium: Calcutta, 819 also Calcutta Review, 1847,] at 12 lbs. per head per annum; and assuming the wages of agricultural labour at three rupees per mensem (the rate now paid on the Calcutta and Bombay mail-road, and also to village watchmen), it would, at Calcutta, absorb the income of five days' labour to provide the quantity required for a year. The salt duty thus operates as a tax of about  $1\frac{1}{2}$  per cent. upon the labourer's wages, if he have none but himself to provide for. If he have a wife or children, the per centage will of course be increased by the amount of their consumption. It is to be observed, however, on the other side, that the wife and children would generally contribute something to the common fund by the earnings of their labour, and thus again reduce the per centage.

At Benares the purchase of the same quantity of salt (12 lbs.) would absorb ten days' earnings, thus constituting a charge of 3 per cent. on the labourer's income. But for this additional charge the Government duty is in no wise accountable. The difference in price is occasioned by the cost of conveyance, profits of trade, wastage, &c., the ordinary charges of commerce.—Of these the principal item is cost of carriage; but on the completion of the railway now in progress this will be greatly reduced in the district which it traverses. It is computed that the expense of conveying a ton of merchandise will not exceed  $2\frac{3}{4}$ d. per mile; consequently salt may be carried from Calcutta to Benares for one half penny per lb.

The pressure of the salt-tax on the labourer cannot be regarded as severe, inasmuch as it is the only way in which he contributes to the pecuniary necessities of the State; in all other respects he is not necessarily subject to taxation.

The preceding remarks apply to the Upper and Lower Provinces of Bengal. In the territories of Madras and Bombay the duty on salt is only about one-third of that which prevails in Bengal; but from other causes the mass of the people are believed to be in inferior circumstances to those of Bengal. In Madras they are still subject to various taxes (moturpha tax, duty on tobacco, &c.) which have been abolished elsewhere.

A comparison of the amount of salt produced with the numbers of the population consuming it, will show that the estimate which assigns 12 lbs. as the ordinary annual consumption of an individual, is nearly in correspondence with fact.

## SALT

The quantity of salt sold wholesale and retail or imported was, in 1846-47, as under:—

	Maunds of 82lb.
Bengal.....	6,166,258
N. W. Provinces.....	2,670,943
Madras.....	4,587,720
Bombay.....	2,573,625
	15,998,546
	82
	31,997,092
	127,988,368
	1,311,880,772 lbs.

If the entire population of *British* India be assumed at ninety nine millions, which from the latest official information may be considered as about its actual extent, the above-mentioned quantity of salt would afford to each individual about 13 lbs., the facts collected by statistical research thus corroborating an estimate founded on observation of the habits of the people.

The following table exhibits the quantity of salt imported into Calcutta from all countries, and also from England, for the last seven years. [Note.—Board of Customs, Salt, and Opium.]

	Imported from all countries.	From England.
	Maunds.	Maunds.
1844-45	970,595	791
1845-46	1,581,968	505,616
1846-47	1,466,744	352,835
1847-48	1,615,084	752,998
1848-49	1,626,706	459,808
1849-50	2,126,848	624,673
1850-51 (the first six months of)	1,455,007	672,092

Statement exhibiting the Net Revenue derived from Salt from all sources, viz., Government Sales, Excise on Private Manufacture, and Customs Duty, from the year 1839-40.

Year.	Bengal.	N. W. Provinces.	Madras.	Bombay.	TOTAL.
	Rupees.	Rupees.	Rupees.	Rupees.	Rupees.
1839—40	1,61,94,188	26,90,511	33,82,422	12,72,209	2,35,39,330
1840—41	1,63,80,084	24,43,614	30,21,805	14,58,218	2,33,03,721
1841—42	1,57,50,967	26,81,822	33,61,806	13,42,601	2,31,37,196
1842—43	1,64,33,412	25,06,731	32,10,959	16,25,339	2,36,76,441
1843—44	1,55,78,010	35,86,467	37,35,644	16,99,579	2,45,99,700
1844—45	1,60,42,730	47,82,645	27,81,389	18,47,502	2,64,54,246
1845—46	1,49,09,021	37,75,196	40,34,020	21,01,109	2,48,19,346
1846—47	1,62,79,725	52,47,071	39,84,188	17,77,565	2,72,88,549
1847—48	1,65,83,668	48,26,209	41,94,855	23,45,006	2,79,49,738
1848—49	1,41,44,321	45,65,642	37,69,440	21,06,855	2,45,86,258
1849—50	1,61,07,384	53,79,810	38,33,312	21,57,591	2,74,78,097

—HURKARU, May 30.

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(2713) SALTPETRE. The soil of the Belary district is very favourable for the manufacture of saltpetre. In the process, the earth is put into pits and mixed with saline water. The solution is afterwards drawn off into earthen pots, boiled, and afterwards poured into shallow vessels to crystallise.—*Cat. M. E. of 1857.*

### (2714) SALVINIA CUCULLATA.

A curious little floating plant, related to the ferns, of the genus salvinia is often seen on the surface of old tanks and stagnate waters in Tenasserim.—*Mason.*

### (2715) SAMANGKA.

The population according to the Districts is:—

	Men.	Boys.	Women.	Girls.	Total.
Samangka, . . . . .	2,337	3,736	2,507	3,426	12,006
Telok Betong, . . . . .	3,423	4,829	3,824	4,616	16,690
Sekampong, . . . . .	1,576	2,723	1,910	2,631	8,840
Marangie, . . . . .	326	544	421	509	1,800
Seputi, . . . . .	3,137	3,756	4,373	2,852	14,118
Tulong Bawang, . . . . .	5,132	9,145	7,976	7,197	29,450
Total, . . . . .	15,931	24,733	21,011	21,229	82,905

—*Jour. Ind. Arch.*

(2716) SAMBAH, amongst Malays, means obeisance, homage, &c., and is used for the ordinary word "to speak" by inferiors to a king; Salaam is the simple Arabic salutation, "peace," subjects or inferiors addressing a king are said to "Sambah" not to chakap or kata or other words used in common use.—*Jour. Ind. Arch. Vol. V. No. XI.*

### (2717) SANATORIA OF INDIA.

*Kussowlie*, is the station nearest to the plains, and is situated in Lat. 30° 56' North Long. 77° East, 45 miles distant from Umballah, and 32 from Simla, its height is about 6,400 feet, there is no table land, and the peaks are rather steep, and pretty densely clothed with fir trees: there is a plentiful supply of excellent spring water 700 feet below the barracks; the meat supplied to the troops is good, and latterly vegetables have been plentiful. The climate may be pronounced to be temperate and agreeable, unless during the rainy season, when dense fogs make it gloomy and depressing. The barracks during the early years of occupation were very inferior, having flat mud roofs, and rooms only 10 feet high, with clay flooring; lately, however, the rooms have been raised to 15½ feet, the floors have been boarded, and the roofs made to slope so that they do not leak.

*Subathoo* lies nine miles from Kussowlie on the road to Simla, at an elevation of only 4,000 feet; the hills are bare of wood, the climate differs from that of Kussowlie in being hotter in summer, and warmer in winter; it is altogether more dry and sheltered, and has an advantage in being seldom visited by fogs. The Barracks were at first unsuitable temporary buildings, but latterly

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they have been greatly improved and added to, and each man, both here and at Kussowlie is allowed space equal to 1,000 cubic feet of air, the water is good and abundant, and the supplies excellent;—the beef being varied occasionally by mutton.

*Dugshai*, is distant 18 miles from Kalka, and is 8 miles east of Kussowlie, and 10 miles south of Subathoo; its height ranges from 5,600 to 6,000 feet; the hills have a bleak and barren look, being completely bare of trees, and covered only by a long coarse grass. The situation, however, has the advantage of free exposure to the prevailing winds; water is abundant and good at the distance of a mile from the barracks which are new, substantial, and excellent, both in point of accommodation and ventilation. The rations are good and occasionally varied, and six acres of ground are laid out as a soldier's garden. The climate is said to be unexceptionable, although the heat of the summer is sometimes oppressive, and the cold of winter rather piercing. In 1851, August was the most rainy month, and in January there were two feet of snow on the ground.

*Simla*, the most in-lying station, is 77 miles from Umballah, in Lat. 30° 6' North Long 77° 11' East, the houses are scattered over an extent of about 7 miles, on a series of heights varying from 6,500 to 8,000 feet which is the highest elevation; it is in most places densely wooded with fir and Rhododendron, and there is much rank jungle which keeps the surface soil constantly damp; both here and at Kussowlie the heat of summer is somewhat tempered by the exhalations from, and the shelter of, so much rich foliage. The climate of the two stations is also very similar, and it has been compared with that of the Cape of Good Hope. The rains commence early in July, heavy dense clouds and fogs then load the air, and with this increase of humidity, disease becomes very prevalent. Water is scarce during the hot months, but I am not aware that it is bad, although many persons take the precaution to boil and filter it; supplies are abundant enough, but in general high-priced. Nothing can be worse than the state of conservancy, at least it was so up to the end of 1851. The smells along all the byepaths were most disgusting from accumulations of human ordure, offal, and dead animals in the numerous deep close ravines that intersect the station; in fact, a native population amounting to 10 or 12,000 persons was almost unrestrained by any police rules, and hence an amount of nuisance that is scarcely credible: the introduction of a Municipal Act has, I hope, greatly changed this state of matters. I can find no accurate data of the fall of rain at the several stations, it has been variously estimated at 60, 80 and 100 inches: at Kussowlie and Simla



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70 inches may be estimated as a fair annual average. The deep ravines and water courses, which intersect all the hills, are dry during the greater part of the year; the heated air ascends from these confined gorges, bringing in the rainy season dense clouds of mist, which are doubtless excellent media for the transmission of the miasmal exhalations that are generated in such places by moist warmth acting upon an abundant vegetation. The following table exhibits, as correctly as I have been able to ascertain, the mean temperature of each month:

STATIONS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Height.	About 70 inches.	Fall of rain.
Kussowlie,.....	42°	47°	58°	64°	77°	73°	70°	70°	72°	66°	...	...	6400	...	...
Subathoo,.....	...	...	...	77°	81°	84°	79°	77°	...	...	...	...	4000	...	...
Dugshai,.....	42°	47°	57°	64°	69°	71°	72°	68°	66°	62°	54°	53°	6000	...	...
Simla,.....	40°	44°	53°	61°	66°	80°	75°	78°	70°	67°	52°	46°	8000	...	...

Comparing the above with the mean temperature of the day at the following Hill stations, we

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most invariably higher in the Simla group, and the fall of rain considerably lower.

Nainee Tal,.....	42°	46°	56°	61°	69°	69°	67°	69°	65°	61°	50°	47°	6200	82°
Landour,.....	35°	40°	54°	...	...	...	...	...	68°	64°	49°	46°	7300	...
Murree,.....	...	...	...	...	...	...	68°	66°	62°	62°	...	...	6786	...
Darjeeling,.....	40°	41°	51°	55°	61°	62°	63°	64°	63°	55°	50°	44°	8008	125°
Mahableshwar,...	63°	64°	71°	74°	71°	66°	63°	63°	64°	65°	64°	630°	4700	239°

Some of these figures are extracted from a communication by Colonel Sykes, read before the British Association for the Advancement of

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There are abundant statistical data of the prevalence of diarrhoea and dysentery at these stations, and the loss sustained has been so considerable as to lead to a very general belief that as sanatoria they have proved failures. In 1843-44, H. M.'s 9th Foot had 350 admissions from bowel complaint, and 57 deaths; while in 1844-45, its second year of residence, there were only 231 admissions, and 17 deaths. The 1st Bengal Fusiliers stationed at Subathoo in 1845, also suffered much, but both regiments came to the Hills in a very sickly state, the one having been decimated by fever and dysentery in Afghanistan, the other by a similar epidemic at Kurnaul during two years. The same may be said of H. M.'s 29th Foot, and the 2nd Bengal Fusiliers, the former having been in a sickly condition with a taint of scurvy for years before, and the latter having been very sickly in Scinde. In 1847-48, the 29th had 33 deaths out of 382 cases of diseases of the stomach and bowels, and out of 25 deaths in the 2nd Fusiliers, 13 were from this class of diseases.

Of late years, regiments in a less unhealthy state have been sent to the hills, and there has been very great improvement in the Barrack accommodation as well as in the conservancy department. In 1850-51, H. M.'s 60th Rifles were stationed, the right wing at Kussowlie, the left at Subathoo the average strength of the regiment was 1,002, and the deaths within the year only 14, of which however 13 were from bowel affections. At Kussowlie there were 220 cases, or 334 per cent. of average strength, with 9 deaths, and at Subathoo 74 admissions, or only 214 per cent., with 4 deaths, showing what has hitherto been rare in the history of these two stations, that the balance of salubrity was in favour of Subathoo. The admissions from diarrhoea were 221 with two deaths, but many more men were attacked, although not admitted into hospital. There were 82 admissions from chronic dysentery, of which 16 with 2 deaths occurred in the last quarter of the year, and chiefly in men who had suffered from repeated attacks of diarrhoea.

In 1851-52, the same regiment, with an average strength of 910 $\frac{2}{3}$ , had of total admissions 892; deaths 36, of which 27 were from bowel complaints, out of 252 admissions divided as follows; dysentery 35 cases and 9 deaths, diarrhoea 215 cases and 17 deaths against 221 cases with only 2 deaths in the previous year. On arrival at Jullunder there were in hospital 57 cases of bowel complaint, and out of the 36 deaths, 9 occurred there, but all from disease contracted in the hills. It will be observed that the actual admissions were less, but the mortality which in the first year had been only 1.39 per cent., to strength, rose to 3.95 per cent., the disease from repeated relapses or from concealment of it, becoming much more intractable.

In 1850-51, H. M.'s 22nd Regiment occupied

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Dugshai; average strength 1,049, deaths 27, of which 7 were from dysentery, and 1 from diarrhoea; the total admissions from this class of diseases were under 200, and the diarrhoea was peculiarly mild. In 1851-52 the second year of residence the average strength is stated to be 1,045 and the deaths at head quarters 20, of which 3 were from dysentery out of 47 admissions, nearly all preceded by frequent attacks of diarrhoea, and 3 from diarrhoea out of 199 admissions. During this year the regiment had fewer casualties, and fewer admissions into Hospital than in any year since its arrival in India. In 1851, during the cold season, it marched to Rawal Pindie, and for months after it had been there, it continued in a high state of health, and efficiency, and without any excess of bowel complaints among the admissions into Hospital.

Of the prevalence of diarrhoea at Simla there are no statistical data; but it has long been matter of notoriety. In slang phrase, the disease is called "Simla trots," and few persons escape one or more attacks in the course of the season. Of late years, however, it appears to have become much more general, and to have attracted more attention, in consequence of many visitors having neglected, or concealed the disease, and thereby experienced years of ill health. The attacks are not confined to persons in broken down health, who have suffered from periodic fever, or other tropical diseases; on the contrary, residents in the prime of life and of sound constitution, have been very generally affected, and among these, examples of its proving fatal are not rare; so late as last year two melancholy cases came under my notice. In one the diarrhoea was aggravated by the fatigue of a dawk journey, and proved fatal in Calcutta by terminating in malignant scorbutic dysentery; in the other, there was only the wasting painless form of disease, and death took place on the passage to England.

Of the various causes assigned, the first and most popular was the bad quality of the water: this however, has been disproved. The water from the springs on the North side of Kussowlie is very pure, while that on the South side is only impregnated with a trace of lime, but to a less degree than is found at many healthy stations in the plains. At Simla, in the hot season, the supply of water is scanty, and not of the best quality, but that is the time when diarrhoea is least common. During the rains the running streams are as pure as could be desired after the first few showers have washed out the water courses; besides, persons who were careful to use only boiled and filtered water did not escape the diarrhoea. Both at Simla and Kussowlie, the trees have gained the repute of producing the disease, by reason of their promoting damp exhalation, and preventing the free circulation of air. But Subathoo and Dugshai are bare of trees, and yet



experience no immunity from the prevailing *endemic*: shows In places the trees require thinning, in order to admit light and air, and to keep down the thick jungle which, at Simla especially, is, I believe, a source of noxious influence: it may be added that the results of experience are in favor of selecting sites, like that of Dugshai, clear of trees and jungle which promote humidity and afford materials for decomposition. The best founded and most influential exciting causes are the cold moist atmosphere, and the great and sudden vicissitudes of temperature by which perspiration is checked, leading to internal congestion, languid and impeded circulation in the liver and functional derangement of that organ. But these ungenial influences of temperature and moisture must have something superadded to them, to account satisfactorily for the inherent and peculiar liability of these localities to produce diarrhoea: the climate of Mussoorie is equally humid, but without the same tendency to diarrhoea, and this may be also said of Nainee Tal, Murree and Darjeeling, the last being remarkably cold and cloudy, and the air long supersaturated with moisture. Other mountain ranges also possess a similar immunity, such as the Neilgherries and Mahableshtar. There must, therefore, to account for its prevalence from year to year, be some cause other than the ordinary or essential climatic agencies, some limited morbid influence of a specific nature, and this appears to me to be partly malarious, partly scorbutic. We know that primary cases of intermittent fever are by no means uncommon at Simla and the neighbouring stations, and we meet with occasional cases of the worst form of typhoid remittent. In the season of 1850, at Simla, I witnessed two cases of malignant typhoid remittent fever; in one of these an officer on the general staff of the Army, the disease proved fatal; in the other, an A. D. C. on the staff of the Commander-in-Chief, recovery took place after a protracted and dangerous illness; both these officers must have contracted the fever at Simla, or in its immediate neighbourhood, probably in crossing some low foul ravine. But notwithstanding these proofs of malaria, experience teaches us that in general it is not here powerful enough to excite periodic fever: it seems to ascend from the numerous deep ravines and water-courses which intersect these stations, but to be so diluted, or changed by the effect of elevation, cold and moisture, as to cause bowel complaints instead, and this is exactly what occurs in some mountain ranges in other parts of the world, where we observe bad remittent fevers at the level of the sea. Intermittents at the higher level, bowel complaints higher still, and at the highest ulcers which appear as the feeblest result of malarious poisoning in depressing the vital powers. The cognate character of these diseases was also remarked in

China, and is noticed by Mr. Wilson in his "Medical Notes." In ships which lay at anchor at some distance from the shore, the miasma was received in a diluted form, and the seamen suffered from an inveterate species of ulcer obviously dependant on malarious taint in the blood.

I may notice also that an opinion has been gaining ground among medical officers in this Presidency that the epidemic ophthalmia, which has of late years been the source of so much inefficiency and loss in European regiments has its origin in the presence of a scorbutic diathesis among the men.—*Ind. Ann. Med. Sci. p. 312.*

(2718) SANDRACOTTUS. Chandragupta was an Indian prince of the time of Alexander and the Sandracottus of the Greeks. It was Chandragupta the Great who was a contemporary of Alexander. His grandson was the no less famous Asoka. The family name was Maurya. Chandragupta married a daughter of Seleucus.

The term Gupta is that of a race of Sovereigns who reigned in India, from the year A. D. 168 to A. D. 230, the first Chandragupta in 195 A. D. and the second A. D. 240.

	LASSEN. SAKA.				
	A. D.	78	A. D. GUPTA ERA.	A. D.	
1 Gupta	150...	...	1	=	158
2 Ghatot kacha,	160...	...			
3 Chandra Gupta I—	168 ..	93 = 171	93		251
4 Samudra Gupta,	195				
5 Chandra Gupta II	230				
6 Kamara Gupta }	240 to 270	121=199	121	=	279
7 Skanda Gupta }		124=202	124	=	282
		Skanda Gupta dies			318
8 Budha Gupta,		165=243	165	=	323
(Toramana)		180 258			

*Prin. Ind. Ant. p. p. 61 & 276.*

(2719) SANSKRIT. The ancient Persian language east of the Euphrates was a near dialect of the Sanscrit. We are ignorant of the date of the introduction of the Arian branch of the Semitic tree into the regions South of the Hindoo Kush and its extension into the Sub Himalayan belt towards Hastinapur. For, as in the case of the Southern Alphabet, its earliest appearance within our ken, is in the counterpart edict of Asoka or Pyadasi, grandson of Chandragupta at Kapur de Giri in the Peshawur valley. And the greater amount of pure Sanscrit which the Kapur de Giri inscription carries in its text, illustrates the descending course of that language; and the ultimate and not very long delayed extinction of all trace of the once extensively prevalent Arian character, and its supercession by the more exact and appropriate system of writing, indigenous to the South. The chief Sanscrit authorities of the Buddhists, still in our possession, were written at the latest, from a century and a half before, to as much after, the era of Christianity. We may be satisfied therefore that the principal Sanscrit authorities which we still possess were composed by the beginning of the Christian era at least, how much earlier is less easily determined. The principal Pali authorities of the South are of a period considerably subse-

quent to the Sanscrit Buddhistical writings of India Proper and date only from the fifth century after Christ.

Professor Max Muller seems to concur in these deductions from his remarking that after Buddhism had been introduced into China, the first care of its teachers was to translate the sacred works from the Sanscrit, in which they were originally written, into Chinese, (*Buddhism and Buddhist Pilgrims*, p. 24. London. 1857) Colonel Sykes, however, still considers from his examination of Gutzlaff's Catalogue of Chinese Buddhistical works, that the books taken from India to China, by the Chinese travellers between the fourth and seventh centuries were equally in Pali. The great body of the Buddhist writings consists avowedly of translations. The Tibetan, Mongolian, Chinese, Cingalese, Burman and Siamese books, are all declaredly translations of works written in the language of India,—and that which is commonly called Fan or more correctly Fan-lan-mo—or the language of the Brahmans. This was in India Proper, undeniably the Sanscrit language, though the Buddhist authorities of Ceylon may have been Pali. The Sanscrit works as they have come into our hands, have been found almost exclusively in Nepaul; those in Pali being obtained chiefly in Nepaul and Ava. Pali is the language of the Buddhists of Ava, Siam and Ceylon; therefore it is concluded it was the language of the Buddhists of Upper India, when the inscriptions on the Lats were engraved; and consequently that they are of Buddhist origin. This however is questioned; it being asserted that the doctrines of Buddha were long taught orally only, and were not committed to writing for four centuries after his death, or until B. C. 153, a date no doubt subsequent to that of the inscriptions. Buddha died 543 years before Christ.

According to Mr. Burnouf and Mr. Hodgson, the earliest Buddhist writings were not Pali but Sanscrit, and they were translated by the Northern Buddhists, into their own languages, Mongol and Tibetan. The Buddhist authorities assert that Sakya Sinha and his successors taught in Pali, and that a Pali grammar was completed in his day. It is not likely that the edicts of Asoka, intended to regulate the moral conduct of the people at large should have been intelligible only to Buddhist priests, or should have been perpetuated only on pillars for their edification. We may therefore recognise it as an actually existent form of speech in some part of India, and might admit the testimony of its origin given by the Buddhist themselves, by whom it is always identified with the language of Magadha or Behar, the scene of Sakya Sinha's first teaching—but that there are several differences between it and the Magadhi, as laid down in Prakrit grammars, and as it occurs in Jain writings. It seems therefore to have been a form of speech

peculiar to the people of Upper India. Of Pali alphabets, may be mentioned that of the Girnar Rocks. The Asoka alphabet (the Sanscrit one.) Tibetan is acknowledged to be of the seventh century. And the Kuteli alphabet of Bareilly.

The ancient Pali or Maghadi alphabet had once a very extended currency, and for a lengthened period retained its separate identity. It occurs in Asoka's edicts at Delhi, Allahabad, Matia, Bakra, Dhauli and Girnar: its appearance in these several localities, would *prima facie* imply that it was intelligible to the people at large, throughout the circle embraced by these geographical boundaries, or that it was the recognised sacred alphabet of Buddhism. Opposed to the latter supposition is the departure from its use in the Kapur-di-giri text of the edict itself and the modification the language is seen to have been subjected to, in some of the Pali transcripts, to meet apparently the local dialects of each site. The available medallie testimonies of coins contributes largely to the inference that these characters formed the ordinary medium of record in the majority of the states included within the limits above alluded to. In this alphabet exclusively are expressed the legends of innumerable series of coins of purely local type; its characters are found associated on the one part with the Greek of Agathocles and Pantaleon and its phonetic signs are conjoined with counterpart Arian legends on certain classes of the Behat coins. Dr. Stevenson remarks, in speaking of the Nasik cave inscriptions, that on the whole, we find that Brahmans and Buddhists, in these early days of our era, lived in peace with one another, and were both favoured and protected by the reigning sovereigns, and that among the former, the Sanskrit language was used in writing and the Prakrit by the latter, the two languages probably holding the same place to one another that the Sanscrit and the Vernaculars do at present.—*Jour. Bomb. Ro. As. S.* 1st July, 1853, p. 41.

Mr. Caldwell says that the Dravidian languages are to be affiliated not with the Indo-European but with the Scythian group of tongues and the Scythian family to which they appear to be most allied is the Finnish or Ugrian. The idioms which he includes under the general term Dravidian constitute the vernacular speech of the great majority of the inhabitants of Southern India. With the exception of Orissa and those districts of Western India, and the Dekhan, in which the Guzerathi and the Marathi are spoken, the whole of the peninsular portion of India, from the Vindhya mountains and the river Nerbudda, (Narmadâ) to Cape Comorin, is peopled, and from the earliest period appears to have been peopled, by different branches of one and the same race, speaking different dialects of one and the same language, the language to which the term Dravidian is here applied, and



cattered off-shoots from the same stem may be traced still further north as far as the Rajnahal Hills, and even as far as the mountain fastnesses of Beluchistan. The Guzerathi, the Marathi, (with its off-shoot the Konkani) and the Uriya, or the language of Orissa, idioms which are derived in the main from the decomposition of the Sanskrit, the vernacular speech of the Hindu population within these respective limits: besides which, and besides the Dravidian languages, various idioms which cannot be termed indigenous or vernacular are spoken or occasionally used by particular classes resident in Peninsular India. The idioms which Mr. Caldwell designates as "Dravidian" are nine in number, exclusive of the Rajnahal Uraon and the Brahui: They are as follows,

1 Tamil,	4 Malayalam,	7 Kota
2 Telugu,	5 Tulu,	8 Gond or Goond,
3 Canarese,	6 Toda or Tudara,	9 Khund or Kund, or Ku

The last four languages are entirely uncultivated. The proportionable numbers of the several races by whom the languages and dialects mentioned above are spoken appear to be as follows

1 Tamil spoken by	...	10,000,000
2 Telugu	...	14,000,000
3 Canarese	...	5,000,000
4 Malayalam	...	2,500,000
5 Tulu	...	150,000
6 to 9 Toda, Kuta, Gond and Khund		500,000

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32,150,000

Whilst he regards the grammatical structure and prevailing characteristics of the Dravidian idioms as Scythian, he claims for them a position in the Scythian group independent of its other members, as a distinct family or genus, or at least, as a distinct subgenus of tongues. They belong not to the Turkish family, or to the Ugrian, or to the Mongolian or to the Tungusian,—but to the group or class in which all these families are comprised. On the whole the Dravidian languages may be regarded as most nearly allied to the Finnish or Ugrian family, with special affinities, as it appears, to the Ostiak.

The conclusions arrived at by Mr. Caldwell with regard to the Northern languages are summed up thus—

It is admitted that before the arrival of the Aryans, or Sanskrit speaking colony of Brahmans, Kshatriyas, and Vaisyas, the greater part of Northern India was peopled by rude aboriginal tribes, called by Sanskrit writers Mlechhas, Dayas, Nishadas, &c., and it is the received opinion that those aboriginal tribes were of Scythian or, at least, of non Aryan origin. On the irruption of the Aryans, it would naturally happen that the copious and expressive Sanskrit of the conquering race would almost overwhelm the vocabulary of the rude Scythian tongue, which was spoken by the aboriginal tribes. Nevertheless, as the grammatical structure of the Scy-

thian tongues possesses peculiar stability and persistency; and as the pre-Aryan tribes, who were probably more numerous than the Aryans, were not annihilated, but only reduced to a dependent position and eventually in most instances incorporated, in the Aryan community, the large Sanscrit addition which the Scythian vernaculars received, would not necessarily alter their essential structure or deprive them of the power of influencing and assimilating the speech of the conquering race. According to this theory, the grammatical structure of the spoken idioms of Northern India, was from the first, and always continued to be, in the main Scythian. And the change which took place when Sanscrit acquired the predominance, as the Aryans gradually extended their conquests and their colonies, was rather a change of vocabulary than of grammar,—a change not so much in the arrangement and vital spirit of Dravida as in the material of the language. This hypothesis seems to have the merit of according better than any other with existing phenomena. Seeing that the Northern vernaculars possess with the words of the Sanscrit, a grammatical structure which in the main appears to be Scythian, it seems more correct to represent those languages as having a Scythian basis, with a large and most overwhelming Sanscrit addition than as having a Sanscrit basis with a small admixture of a Scythian element (page 38). The Scythian substratum of the North-India idioms presents a greater number of points of agreement with the Oriental Turkish or with that Scythian tongue or family of tongues of which the new Persian has been modified, than with any of the Dravidian languages.

The locality of the Andhra dominion has hitherto been as uncertain as the period of its sway. Wilford says at one place that the Andhra princes made a most conspicuous figure on the banks of the Ganges for above 800 years. Again, that Andhra and Koshala (near Kalinga) are used synonymously by some Hindu authors: again, that Sricarna-deva took the title of king of Tri-Kalinga, or of the three shores, to the east and west and south of India. The general term of Dakshinapetha (Dekhan) agrees well with the latter definition, and we may rest content with denoting the Sata Karnis as Kings of the Peninsula. There were Andhras at the beginning of the Christian era, when, says Pliny, the Andaræ Kings were very powerful in India, having no less than thirty fortified cities, an army of 100,000 men and 1000 elephants.—*Prin. Ind. Ant. Vol. II. p. p. 31, 33; 34; 45; 46; 50; 51 and 67.*

(2720) SAPI, name given on the Moar river to a wild cattle, with much the appearance of Bali cattle, but without the white patch on the buttocks. The horns are small, curved in-

wards, white, tipped with black, the forehead is flat, with a tuft of long hair on it, particularly on the bulls.

(2721) SAPOTA ELENGOIDES, a large tree common on the Neilgherries, wood strong and elastic like the hawthorn, burns well when green, —*McIvor, M. E.*

(2722) SARCOCOCCA TRINERVA OR NEILGHERRY BOX WOOD. Tree very common on the Neilgherries, wood hard and durable, might be used as common Box wood in the arts. —*McIvor, M. E.*

(2723) SARHI. HIND. MAR. PUDAWI, TAM. A garment worn by women in India. Viscountess Falkland, in Chow-chow page 7, says, I saw a group of women, with their heavy anklets, 'making a tinkling with their feet, (Isaiah iii. and 16,) their sarhis folded over their heads and persons, and carrying little chubby children on their shoulders, or astride on their hips; and now these are lost to sight, and a fresh group appears, consisting of Hindoo women of various castes, clothed in jackets and sarhis of divers colours, and wearing the 'chains and the bracelets' the earing, 'the rings and the nose rings.' Isaiah iii, 19 and 21."

The Sarhi is the name of the mantle or veil worn by the women of India, one end forms a very voluminous kind of skirt or petticoat, the other end is then drawn over the head and shoulders, somewhat in the style or form of a Maltese faldetta. —*Viscountess Falkland Chow Chow, page 7. London 1857.*

(2724) SASSANIAN MONARCHY. This commenced, in Persia, in the year 223 A.D. when Artaxerxes overthrew the Parthian dynasty, and it continued until itself overturned by the Mahomedan Khalifs in the year A.D. 636. —*Prin. Ind. Ant. p. 13.*

(2725) SATRAP: KSIATRAPAS. Sans. Although wholly unknown as a sovereign title to modern Hindus and not to be found in their books, this term is familiar to the reader of the Grecian history of ancient Persia, with merely a softening of the initial letter, as Satrapa ΣΑΤΡΑΠΗΣ, the prefect of a province under the Persian system of Government. It is an obsolete Persian title (Hind.) for the governor of a province. In Sanscrit it signifies the ruler, feeder, or patron of the Kshatra or military class, and now that we know the ancient language of Persia east of the Euphrates to have been a new dialect of the Sanscrit, we may conclude that Satrapa had the same signification in Arabia. The effeminate Persians, at a very early period were in the habit of governing their numerous tributary provinces by mercenary troops. The same system and the same denomination of Satrap, was adopted and retained by the Macedonian conquerors, alike when Greek or native

officers were employed. And instances are frequent enough of the Satraps assuming to themselves independence and a regal title. The Satrapies of the ancient Persian monarchy are not supposed to have extended across the Indus. It was in Alexander's time this limit was first transgressed, it was not long prior to the time when the Bactrian Greeks or the Parthians, made themselves masters of Sindh, Kutch and Gujarat —*Prin. Ind. Ant. Vol. II. p. 64.*

(2726) SATPURA MOUNTAINS. On a spur of this range near the Nerbuddah is a Colossal Jain figure cut in relief nearly 80 feet high.

(2727) SATR-SOWA. Myrtus communis. Myrtle leaves are eaten with black pepper to cure emissions that occur from debility. —*Genl. Med. Top. p. 152.*

(2728) SAYUR KALADI. Malay. Sayur is the generic term for vegetables. Kaladi is a species of vegetable (the Arum colocasia of Roxburgh) with a large leaf and an edible root, which grows in marshy ground and is much used by the Chinese for food for their pigs. —*Jour. Ind. Arch. No. XI. Vol. V.*

(2729) SEENKH. HIND. The Culm of the Khuskus. Andropogon muricatus.

(2730) SEHARUNPORE, in North-Western India, the site of the Botanical Gardens of the Government of India.

(2731) SEIDBURROO. A Nepaul tree, the bark of which is manufactured into a strong useful paper; it is also made into rope and black thread, but neither of them resist moisture well. —*Smith's Nepaul.*

(2732) SERAPADA OR SRIPADA, the name given in Ceylon to the footstep of Buddha, on the mountain Sumanakuta or Adam's peak. —*India in the 15th Century.*

(2733) SEVALIK HILLS, A Sub Himalayan range, chiefly known to science for the numerous fossil remains discovered in them. Fossil Camels, a fossil Gharial: fossil bear (ursus sivalensis); fossil tiger (felis cristata): a new fossil ruminant called Sivatherium giganteum and many others, mammals and reptiles.

(2734) SEVATHERIUM GIGANTEUM. A fossil ruminant discovered by Sir P. T. Cautley in the Sewalik Hills.

(2735) SHADEE. See NIKAH.

(2736) SHAN. The Shans, or Tai as they call themselves, are the most extensively diffused and probably the most numerous of the Indo-Chinese races. Lapping the Burmese round, from North-west by north and east to South-west, they are found from the borders of Munnipoor to the heart of Yunan and from the valley of Assam to Bangkok and Kamboja; every where Buddhist; every where to some extent civilised,



and every where speaking the same language with little variation. Their traditions as also those of Siam, speak of a great kingdom held by this race in the north of the present Burmese Empire, but the race is now split into a great number of unconnected principalities and the kingdom of Siam is now perhaps the only independent Shan state in existence. All the others are subject or tributary to Ava, China, Cochin China or Siam.—*Yule, Jour. Roy. Geog. Soc. Vol. xxvii. 1857.*

(2737) SHENDOOS. See HEUMA.

(2738) SHIM is the Tamil and Malayala name of a tree commonly known as the "Buttress tree." It grows to an enormous size. Edye saw one forty-five feet in circumference, and one hundred and ten feet long. It is a soft, spongy sort of wood of a white colour; not durable, or of much use, unless it is oiled, when it may last for five or six years for canoes or catamarans, provided they are taken out of the water when not wanted. If it be kept in water, two years will render it water-logged and useless.—*Edye. M. & C.*

(2739) SHOU. *The shou or Tibetan stag, Cervis affinis*, [Note. Dr. Campbell, superintendent of Darjeeling has presented to the Society the horns and skin a very fine specimen in beautiful preservation.]

The Shou is from eight and a half to nine feet in length and from four and a half to five feet high at the shoulder. The head is twenty-two inches long, nine deep and seven and three quarters wide. The ears are eleven inches long. The tail, less the hair, is three to four inches. The fore leg, from mid flexure downwards, is eighteen inches; and the hind leg, nineteen inches and more. The fore hoof is four and half inches long, three and three-eighths wide, and three high. The hind hoof, four and one quarter inches long, three in width and the same in height or depth. The horns are five feet long, three to four in spread between the tips, and ten to eleven inches thick at base.

The general form of the animal is full of grace and vigour; assimilated to that of the European stag, but with greater strength of limbs and broader hoofs. The head is finely shaped with broad flat forehead a little depressed before the horns, a slightly arched chaffron and graceful termination forwards, not actually thickened, as I had supposed, though less attenuated, than in Hippelaphus, Elaphoides and Axis, or the tropical Deer; and the muzzle or rude extremity of the nose is decidedly smaller than in them, perhaps even more so than in the stag of Europe. The suborbital sinus is likewise conspicuously smaller, in skin and in skull, than in the tropical Deer just cited, or in the Muntjacs, though not inferior in size to the same organ in our red deer, I apprehend. In the feet there are no interdigital pores, before or behind; nor

are there apparently any calcic tufts or glands; though in one sample a rudity appears on the os calcis which has somewhat the semblance of this latter organ.

The graceful and majestic horns are inserted on the summit of the frontals but much before the occipital crest, upon a moderate foot-stalk which reclines considerably and is surmounted by a moderate-sized burr. The horns have an ample sweep and curve, both spreading and reclining much, and then approximating more or less, and for the most part greatly so, towards their tips, thus forming large segments of circles.

Mr. Hodgson has no longer any doubt that the Shou is the same species as that described by him under the name of Affinis in the journal, ten years back, I got, he says, that splendid sample in the Tarai; but it had, I now conclude, been carried there from the Himalaya or from Tibet. The Shou inhabits a wide extent of country in Tibet, but is rarely if ever found in Chumbi, and not at all in the juxtanivean districts of Bhutan, as priorly affirmed. Wherefore it cannot be classed as Himalayan as well as Tibetan. Capt. Cunningham assures me that the stag of Cashmir is the same animal; but Mr. Gray and Dr. Falconer judge otherwise; and, as it now appears that the Shou is *not* found in any cis-Himalayan district, nor even in Chumbi with its half Himalayan and half Tibetan climate, I think this identity very questionable, as also that with the Maral or stag of Persia. But I am strongly inclined to the conjecture that the stags of Mongolia, of Manchuria, and of southern Siberia, are all identical in species with the Shou; and I am almost satisfied that the Stag of Tibet is specifically the same with the Wapiti of North America, especially that of Canada or the Canadian variety, called often the North-western stag. Besides the ample spoils of the Shou, I have now before me a stag's horn from Ladak which may possibly belong to this species, though, being that of a young animal, I cannot say. It is anomalous if appertaining to the Shou by the extreme remoteness from each other of the two basal lines, which in a horn of but 34 inches long is above 4 inches ( $4\frac{1}{4}$ ), whilst the next snag above may be the central, or it may be the apical, one.

(2740) SHUB-I-BURAT. PERS. This Mahomedan feast is held on the 14th and its *arfa* on the 13th of the eighth month Shaban.

(2741) SHUB-GUSHT. PERS. Nocturnal perambulation, a ceremony practiced by the Mahomedans in India, on occasions of marriages; circumcision, &c.—*Herz.*

(2742) SHUJH OR MILK TREE. Grows to an enormous size on the summit of the lofty Hills north of Nepaul.—*Smith's Nepaul.*

(2743) SHUREEF. ARAB. The progeny of

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a-Sheikh father and a Syedani, amongst Mahomedans.

(2744) SHUWAL, ARAB. The tenth month of the Mahomedan year.

(2745) SHIVE-DAGON. This has for two thousand years "shot upwards, like a pyramid of fire" athwart the dismal flats of the delta of Pegu. The height above the ground level is 487 feet and above the platform 321 feet.

(2746) SHIVE-OO-DOUNG. A great mass of mountains which runs parallel to the Irawaddi as far as Amarapura, one peak estimated to be 6000 feet in height.

(2747) SIRI. The ancient name of the ancient city of Delhi; prior to its capture in A. H. 587, A. D. 1191.—*Prin. Ind. Ant.* 326.

(2748) SINDBAD. A voyager, well known to Europe as having his history incorporated in the Thousand and one nights, but they form in Arabic a distinct and separate work, which Baron Walkenaer (in *Nouvelles Annales des Voyages*, tom. liii p. 6) regards of equal value with those of Soliman and Abu Said. His first voyage appears to have been to the Western Coast of India when the Bejanuggur dynasty ruled, as he calls it Maharaj. Riha, was the termination of his second voyage, and was probably the Malay Peninsula as he describes it as producing camphor. And in his third voyage the island with ferocious savages seems to have been the Andaman. His fourth voyage would seem to have been the coast of Malabar, whence he went to the island of Nacaus apparently the Nicobars, thence in six days to the island of Kela, which Baron Walkenaer recognises as Quedah in the Malay Peninsula. In his fifth voyage where he is shipwrecked and becomes the victim of the Old man of the sea, the site is supposed again to be the Malabar Coast. After his escape he visited the Maldives, Cape Comorin, for Aloes wood, and to the Gulf of Manar for Pearls. In his sixth voyage, he is thrown on an island where superb Aloe wood trees, *Santy* and *Comari*, were growing, whence he finds his way to Serendib the present Ceylon, which was the object of his seventh and last voyage where he was sent as ambassador from Caliph Haroon oor Rasheed.—*Ind. in the 15 Cent.*

(2749) SIN-HOA, Aurea Chersonesus.

(2750) SILVER COINAGE OF INDIA.

Silver is the legally constituted medium of exchange in all money transactions throughout the British Indian possessions.

Gold coin was till lately a legal tender, at a fixed value of sixteen rupees for the Gold Mohur of Calcutta, and fifteen Rupees for that of Madras and Bombay: but it was not demandable in payment and was left to find its current value in the market.

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By a notification of the Government of India on the 22nd December 1852, it was declared that on and after the 1st of January 1853, no gold coin should be received on account of payments due, or in any way to be made to the British Government of India. The motive and object of the order was to escape from the consequences of the condition of the gold coin of India, and the erroneous principles, adopted for its manufacture, at a time when the gold of California and Australia, began to affect the market. The first considerable increase in the import of gold at Calcutta was in the year 1848-1849, and a large portion of it was sent to the mint, in that and the following years, for conversion into the low standard lion-device pieces, brought out by Act XVII of 1835. The sending of gold to the mint at this period, was in reality, a mere sale of the metal to Government for silver, at the par rate of 15 to 1, which then began to prevail as the market rate. The Mint certificates, obtained for gold delivered were immediately paid in at that par, in satisfaction of Government dues, or were negotiated at the banks, where silver was always claimed upon them under the option then given of receiving the amount in rupees at the par in question. And thus the gold which had been coined at the Mint remained as a dead balance in the Government Treasury, owing to its not being issuable at the par of 15 to 1, in the condition of base standard coin to which it had been manufactured. Besides the accumulation produced through gold deliveries at the Mint of Calcutta, low standard coin, previously issued, began also to be paid into the Treasury, at the established par rate in ordinary transactions, under the Proclamation of 1841, so that out of a total amount of lion-device gold mohurs, not exceeding in value seventy lacs of rupees, which was the value of the coinage up to that date, more than fifty lacs were, in 1852, in deposit in the Government Treasury, as a dead unserviceable balance.—*Vol. II. p. 70.*

In the eight years 1846-47 to 1853-54 the total quantities of Silver Bullion minted at the three Presidencies, was

For the year.	Cos. Rupees.	For the year.	Cos. Rupees.
1856-47...	1,78,29,573	1850-51...	2,27,20,336
7-48...	62,15,873	1-52...	3,73,55,808
8-49...	93,86,998	2-53...	5,45,13,630
9-50...	1,93,79,343	3-54...	3,28,26,087

At the Bengal Mint, total Rs. 10,68,53,021

„ Madras „ „ „ 1,36,78,352

„ Bombay „ „ „ 7,96,96,280

Cos. Rs.... 20,02,27,653

The currency in India has been increasing. The population returns, though most minutely accurate for some portions of India, are but mere guess work for others. The following is the latest return from the India House and gives



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for British India, a return of 1½ rupee per head of increase to the currency in eight years.

### Population of India.

Under direct administration of the Governor General (including the Punjab, Nagpore and Oude,).....	23,055,972
Under Lieut. Governor of Bengal,....	41,212,562
"    "    "    "    North	
West Provinces,....	33,216,365
Under Governor of Madras,.....	22,437,297
"    "    "    Bombay,.....	11,109,067
<hr/>	
Total British Possessions,...	131,031,263
"    Independent and protected Native States,.	48,423,630
"    Foreign States, French and Portuguese,.....	517,149
<hr/>	
Total...	179,972,042

The rupee is the unit or standard measure of value throughout India, and by the Regulation, a perfect assimilation in weight and fineness has been effected in this unit of currency of the three Presidencies, so that the rupee of Upper India, of Madras, and Bombay are now identical in value. The great variety of coinage which formerly existed, the Arcot or Madras Rupee, the Furruckhabad Rupee, the Bombay Rupee, the Moorsheadabad or Sicca Rupee, has thus ceased, and it is only in Native states, with independence, that other local coins are current.

The following table exhibits the scheme of the British Indian monetary system :

Gold muhr.	Rupee.	Anna.	Paisa.	Pai.
Calcutta..... 1 ...	16	256	1024	3072
Madras & Bombay 1 ...	15	240	960	2880
	1	16	64	192
	...	1	4	12
	...	...	1	3

Copper coin is only a legal tender at the established rate of sixty four paisa to the rupee, on payments falling short of a rupee.

Small shells called Cowries or Kauris كوري are also made use of for fractional payments and are reckoned as follows :

- 4 Kauris make 1 Ganda.
- 20 Gandas ,, 1 Pan.
- 5 Pans ,, 1 Anna.

but their value is subject to considerable fluctuation.

Silver pieces, of eight annas, four annas, and two annas, are struck of equal proportionate weight with the rupee: and copper coins of half anna, quarter anna, and one-twelfth anna complete the coined currency.

The numerous Mints, the great debasement of their coinage and the complications resulting therefrom, led the Government of India, on the

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10th September 1824, to resolve on the abolition of several Mints and to induce Native Sovereigns to equalise their rupees with those of other Mints. At that time, none of the coins forming the circulation of Hindustan, bore any other name than that of Shah Alum.

All the British Mints in India are open to the reception of gold and silver bullion for coinage on private account, and the following is the course of proceeding in the Calcutta Mint. After examination by the processes of cutting and burning, to ascertain that there is no fraudulent admixture, the proprietor takes a receipt from the Mint Master, for the weight of his bullion. A specimen is then taken from Assay, and after that operation the Mint receipt is exchanged at the Assay Office, for a Certificate of the Standard value of the bullion in gold or silver money. This Certificate is convertible into cash at the Treasury as soon as the new coin may be transmitted thither from the Mint.

A deduction is made from the Assay produce of bullion, to cover the expenses of coinage, which vary at the different Mints as follows :

	On Gold Bullion.	On Silver Bullion.
At the Calcutta Mint	2 per cent.	2 per cent.
"    Madras	3 "    "	2 "    "
"    Bombay	2½ "    "	2 "    "

On the re-coinage of rupees struck at the Mints of the Bengal Presidency, a charge of 1 per cent only is levied.

The following notes on the names of the coins and the schemes of the coinage of Eastern and Southern Asia may be found of interest.

(2751) *Ashrapi*. Moorshedabad Gold Mohr, has a weight of 190·895 grains troy.

(2752) *Adhela*, from adha, Hind, half signifies the half of a paisa.

(2753) *Ava specie*. The Burmese, it is well known, have no coined money, but, like the Chinese, make their payments in the precious metals by weight. Like the latter nation, also, they make use of decimal divisions in estimating the value or purity of gold and silver, and their systems of weight and measure follow the same convenient scale. Major Burney, Resident at Ava, gave the following particulars :

Vis, Tikal, and Moo are the general terms used in the transactions of commerce and accounts : their subdivisions and multiples are,

- 1 pe or be.
- 2 = 1 moo.
- 2½ = 1 mat.
- 5 = 2 = 1 hkwe.
- 10 = 4 = 2 = 1 kyat or tikal.
- 1000 = 400 = 200 = 100 = 1 peiktha or visson.

100 tikals are precisely equal to 140 tolas.

The expressions employed by the Burmese goldsmiths in declaring the quality of bullion

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require a knowledge of the Burmese numerals, and a few other words :

NUMERALS.		METALS.	ASSAY TERMS.
1. Ta.	6. Khyouk.	Shew, gold.	Det, better or above.
2. Nheet.	7. Khwon.	Shwence, Red or pure gold.	Mee, differing + or —.
3. Thoun.	8. Sheet.	Nguee, silver.	Meedet, better in assay.
4. Le.	9. Ko.	Ge or khle, lead or alloy.	Meeshyouk, worse ditto.
5. Nga.	10. Tshay.	Nee, copper. Byoo tin.	Ma, adulterated.

The usual weight of the small lumps of silver current in the place of coin is from twenty to thirty tikals (thirty or forty tolas) : they bear a variety of names from their quality and appearance, the figures given by the action of the fire upon a thick brown coating of glaze (of the oxydes of lead and antimony) answering, in some degree, the purpose of a dye impression.

'*Ban*' signifies 'pure' or 'touch,' and is the purest obtainable of the Burmese process of refining. The word *Ban* is synonymous with the 'Bani' of the 'Ayin-i-Akbari.' *Banwari* is the Indian name of the touch needles used in roughly valuing the precious metals.

*Kharoobat*, 'shelly' or 'spiral circled,' is applied to a silver cake, with marks upon its surface, produced by the crystallization of the lead scoria in the process of refinement: it is supposed to denote a particular fineness, which, by Burmese law, ought to be ten-ninths yowetnee in value, i. e., nine tikals of *kharoobat* pass for ten of yowetnee silver; or it should contain nineteen and a quarter *ban* and three quarter copper.

*Yowetnee*, red-leaved flowers or star, silver, is so named from the starry appearance of the melted litharge on its surface. *Yowet* is a corruption of *rowek*, 'leaf,' and the word is sometimes written by Europeans *rowanee*, *rouni*, *roughanee*, etc. *Yowetnee* is the Government standard of Ava, and contains by law eighty-five *ban* and fifteen alloy per cent. Taking it at nine-tenths of purity of *kharoobat*, which last is 94.6 touch, its quality will be 85.2 fine; which closely accord with the legal value. The average of 60,000 tolas of yowetnee in the late Ava remittance turned out two dwts. worse (90.8) but there was a loss of more than one per cent, in melting, from the exterior scoria.

*Dain*, the most common form of bullion met with in circulation, is so called from an assessment, levied during the late king's reign, upon villages and horses: *dain* signifying 'a stage,' or distance of two miles. These cakes also weigh from twenty to thirty tikals each. Their prescribed legal quality is ten per cent. better than yowetnee, which puts this species of silver on a par with *kharoobat*. In practice, however, the quality varies from one to ten per cent. better (five Br. to thirteen and a half Wo.) than Calcutta standard. The average of fifty-two lakhs of *dain* turned out three penny-weights

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There is an adulterated *dain* silver, stated by Major Burney to be similar in quality to yowetnee, but in reality much worse (forty-two and a half pennyweights worse) lately introduced and extensively circulated: it is made by admixture of lead, and is called *Ma-dain*.

The following will serve as examples of the mode of valuating bullion :

*Dain*, *ko-moo-det*, is *Dain* nine per cent. better. (See previous explanation.) *nga-moodet*, five per cent. better. *Yowetnee*, standard, (Eighty-five touch.)

*Kyat-ge*, or *ta-tshay-ge*, one tical or tenth of alloy (meaning one-tenth weight of alloy added to standard).

*Kyouk-tshay nga-kyat-ge*, six tens five tical alloy (meaning sixty-per cent. of alloy added). *gyan*, half yowetnee (and half alloy.)

*Gold*. The purity of gold is expressed by moss or 'tenths' only; ten moss, 'tshay moo,' (one hundred touch) being esteemed pure gold.

'*King's gold*,' or standard, is called *Ka-moo-ta pe-le-yowe* (nine moss, one pe, four seeds), or nine and three-quarter moss fine.

'*Merchant's gold*' is *Ko-moo-ta-be*, nine and a half moss fine. Gold muhrs are called eight and a half moss fine by the Ava assayers.

(2754) *Bactria*. In the reign of Antiochus II, the third of the Selencidæ, Theodotus, the Governor of Bactria, revolted and established an independent monarchy, his capital was the modern Balkh, and his extensive kingdom included parts of Cabul, Khorasan and Bokhara, by aid of their coins, the names of nine of their princes have been brought down to us. Coins have been discovered at Surapura and Mathura, between Agra and Etawah, and others in the Punjab.

Indeed both Grecian and Persian coins are met with frequently in India. General Ventura and Sir Alexander Burres collected many Greek coins in Ancient Bactria and the Punjab. Major Tod discovered one of Apollodotus and one of Menandu at Mathura. From the coins, there is reason to believe that the Greek princes were succeeded by Buddhist rulers.

(2755) *Cash*, کاش Hind. A small coin once current in Southern India. Twenty cash being equal in value to four falous.

*Kas* may be a corruption of the Sanscrit word *Karsha*: which is mentioned in Colebrooke's Essay on Indian Weights, as the same with the word *pan*. A *Karsha*, or eighty raktikas (ratis) of copper is called a *Pana* or *Karsha-pana*. It is now the eightieth part of a *pan*, but similar discrepancies are common throughout, and the simple word is all that can be identified as having survived the changes of system.

According to the old Madras system, accounts



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8 kas = 1 fanam

336 „ = 42 (silver) fanams = 1 Pagoda

The Company reckoned twelve fanams to the Rupee and three and a half Rupees to the pagoda. But the bazar exchange fluctuated between thirty-five and forty-five silver fanams per pagoda: fanams were also coined in a base gold.

Copper 1, 5, 10, and 20 kas pieces were coined in England, by contract, for Madras, so early as 1797. The 20 kas, was also called “dodo” and falus. The Star Pagoda weighs 52.56 grains and is nineteen one-fifth carats fine. It is therefore, intrinsically worth 7 shillings  $5\frac{1}{4}$  sterling, but it is commonly valued at 8 shillings. Many varieties of the Pagoda used to circulate on the Coromandel coast, but since 1833 they have been only obtainable when sought for.

In 1811, a coinage from Spanish dollars took place, consisting of double rupees, rupees, halves and quarters; and pieces one, two, three and five fanams, the rupee weighed 186.7 grains. A silver coinage of half and quarter pagodas, of dollar fineness, also then took place; the half pagoda weighed 326.73 grains troy, and was equal to  $1\frac{1}{4}$  Arcot Rupees. By a proclamation of 7th January, 1818, the silver rupee of one hundred and eighty grains, was constituted the standard coin, and all accounts and public engagements were ordered to be converted at the exchange of three hundred and fifty rupees per hundred pagodas. The proportion between the old and new currency then became  $3\frac{1}{2}$  rupees per pagoda, and in copper (75) seventy-five kas old currency = 14 paisa new currency.

(2756) *Chinese Currency.* Sycee silver, in Chinese Wan yin, is the only approach to a silver currency among the Chinese. In it, the Government taxes and duties, and the salaries of officers, are paid; and it is also current among merchants in general. The term Sycee is derived from two Chinese words, Se-sze, ‘fine floss silk,’ which expression is synonymous with the signification of the term Wan. This silver is formed into ingots, (by the Chinese called ‘shoes’) and by the natives of India, khuri, or ‘hoofs,’ which are stamped with the mark of the office that issues them, and the date of their issue. The ingots are of various weights, but most commonly of ten taels each.

Sycee silver is divided into several classes, according to its fineness and freedom from alloy: the kinds most current at Canton are the five following:—

(a) *Kwan-heang*, ‘the Hoppo’s duties’, or the silver which is forwarded to the imperial treasury at Peking. This is ninety-seven to ninety-nine touch. On all the imperial duties, a certain percentage is levied for the purpose of turning them into Sycee of this high standard, and of conveying them to Peking without any loss in the full amount. The Hoppo, however, in all probability increases the per-centage far above what is re-

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quisite, that he may be enabled to retain the remainder for himself and his dependants.

(b) *Fan-koo or Fan-foo*, the treasurer’s receipts, or that in which the land-tax is paid. This is also of a high standard, but inferior to that of the Hoppo’s duties, and being intended for use in the province, not for conveyance to Peking, no per-centage is levied on the taxes for it.

(c) *Yuenpaou or Une-po*, literally ‘chief in value.’ This kind is usually imported from Soochow, in large pieces of 50 taels each. It does not appear to belong to any particular government tax.

(d) *Yen or Eem-heang*, ‘salt duties.’ It is difficult to account for these being of so low a standard, the salt trade being entirely a government monopoly. This class is superior only to

(e) *Mut-tae or Wuh-tae*, the name of which, signifying ‘uncleansed or unpurified,’ designates it as the worst of all. It is seldom used, except for the purpose of plating, or rather washing, baser metals.

The tael of Sycee in the East India Company’s accounts was reckoned at 6s. 8d. sterling. When assayed in London, this metal is frequently found to contain a small admixture of gold. Mercantile account sales give the following average out-turn of China bullion remittances to London, Calcutta, and Bombay; that

100 taels of Sycee yield	£ 316 at 5s. an oz. including
	1½ per cent. for gold.
	3078 Sikka Rupees, or with
	charges 3062 Rupees, at Calcutta.
	3335 Bombay Rupees, or with
	charges 3302 Rupees, at Bombay.

(2757) *Copper coins of India.* Information regarding the copper coin in circulation throughout Central India is very limited, but it is well known that as much perplexity existed in the varieties of paisa, and in the greater range of their value, as in the coins of the more precious metals; so that every town and village almost had its separate currency, and its established nirkh, or, rate of exchange, with the rupee, to the great inconvenience of the traveller and of the poorer classes. In weight they vary from 280 grains (the Jaipuri, etc.) to 34 grains (the Maiwari): the former passing at about 35, the latter at 378, paisa for a rupee. From the small advantage of melting up copper money, it happens that much of the circulation in this metal is of very great antiquity; and not only many ancient Hindu coins are met with, but Bactrian and Roman copper coins are also frequently procurable at fairs and in the neighbourhood of old towns in Upper India.

The paisa was in some cases adopted as the unit for determining the larger weights of the bazars, as the Gorakhpur paisa, of which 530 were held equal to a passeri (five sers) at Gha-

## SILVER COINAGE OF INDIA.

zigue, and generally through the Benares province, 2,881 'chalans' of Fatehgarh in like manner were assumed as the weight of a man in that district. The Delhi paisa, coined till 1818, was twelve mashas or one tola in weight.

Most of the native paisa contain more copper in proportion to their value than the present Company's coin, which was, however, originally one tola in weight, and was gradually reduced to one hundred grains: it is at present in fact a government token, worth, intrinsically, less than its nominal value.

Within the Ceded Territories, the native coins still predominate, but the Company's paisa gradually to the westward, and the Sagar mint was for several years employed in converting the native copper money into Benares or trisuli paisa of one hundred grains weight, and sixty-four to the rupee. At Bombay, the old paisa were bought up by Government, for the purpose of removing them entirely from circulation, and substituting the new coin. The Bengal Government also adopted a measure to withdraw the trisuli paisa from circulation, in consequence of their becoming much depreciated in public estimation from a large admixture of spurious coin, and other causes; the Calcutta mint being ordered to grant sixty-four new paisa for seventy-two trisulis, for an amount not under twenty rupees in value brought for exchange.

(2758) *The Cowrie shell*, *Cypræa moneta*, has greatly fallen in value, in consequence of the facilities of commerce. In 1740, a rupee exchanged for 2,400 Cowries: in 1756 for 2,500; and recently in Calcutta, so many as 6,500 Cowries could be obtained for a rupee. In Madras, in 1850, Cowries have ceased to be used as money, but in Hyderabad of the Dekhan, in 1856, 2,688 Cowries were to be had for a rupee. Cowrie, in Persian, is simply khur-mohra, literally "jack-ass or mule shell" because mules are ornamented in that country, with trappings of shells, as a Gosain's bullock and riding horses are in India. In Arabic, it is known by Wuda, which Ibn-Batuta says were carried in large quantities from the Maldivé Islands to Bengal, where it was used as a coin, and therefore no doubt can be entertained that the *Cypræa moneta* was meant. It is employed throughout all Southern Asia, as an amulet, in sickness, and to avert the evil eye, provided the neck shell is split or broken. Among European nations these shells, on account of the fancied resemblance of their shape to that of the back of a little pig, are known by the names of Porceli, Porcellain, Porcellanen and Porcelaine, whence we have Porcelain, the glaze or varnish on the Chinese ware being similar to that of the Cowrie. If sound be taken, our English phrases, "not a Cowrie and not a cash" would seem derived from these two minute Indian monies.

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(2759) *Dam*, دام A copper coin of India, now obsolete. In Akbar's time, forty dams of copper, were equivalent in account to one rupee, and the dam of copper is itself defined at five tanks, or 1 tola, 8 mashas and 7 ratis in weight, which at 186 grains per tola is equal to 323.5625 grains.

There seems to have been 9.29 chitals in each dam, and in the Shir Shahi rupee 371.8 chitals, instead of the old 320 divisional coins of that name and value, which went to the lighter silver piece of former days. In the Ayeen-i-Akhbaree, and in most Revenue accounts, the Dam is considered the 40th part of a rupee: but to the common people it is known as the 50th of a Tuka: 25 therefore go to a Pysa, and 12½ to an Adhela.

(2760) *Denar*, دينار A Persian gold coin, from the latin *denarius*.

(2761) *Dilli-All*, دلي ال or *Dhili wal*. دھلي وال In A. H. 614, the ordinary coin of the country about Delhi. "The original currency, it is supposed, corresponded with the billon money of Prithui Raja and others, which was imitatively adopted by the Mahomedans in the early days of their occupation of Hindustan.

(2762) *Dirham*, درهم An Arab Persian silver coin from the latin *drachma*.

(2763) *Dumree*, دمري Hind. Dumree is commonly known as a nominal coin, equal to 3¼ or 3½ Dams; or between 2 and 3 Gundas: so that a Dumree varies from 8 to 12 cowries according to the good will and pleasure of the money changers—p. 92.

(2764) *Fals*, فلس An ancient Arabic copper coin, named from the Roman *folius*.

(2765) *Ganda*, گنده Hind. See CASH

(2766) *Indian System of Coinage and Currency, in India.*

The silver rupee was introduced according to Abul Fazl, by Shir Shah, who usurped the throne of Delhi from Hamayun in the year 1542. Previous to his time, the Arabic dirham (silver drachma), the gold dinar (denarius auri,) and the copper fals (folius), formed the currency of the Moghul dominions. Shir Shah's rupee had on one side, the Mahomedan creed: on the other the Emperor's name and the date in Persian, both encircled in an annular Hindi inscription. Since the same coin was revised and made more pure in Akbar's reign, we may assume the original weight of the rupee from Abul Fazl's statement, to have been eleven and a quarter mashas. Akbar's square rupee, called from its inscription, the Jelali, was of the same weight and value.



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This coin was called Char-yari, from the names of the four friends and immediate successors of Mahomed, Abu-bakr, Omar, Osman, and Ali, being inscribed on the margin. This rupee is supposed by the vulgar, to have talismanic power.

Concerning the weight of the Mashas of the Mahomedans, some difficulty prevails, as this unit now varies in different parts of India. Mr. Colebrook makes it seventeen grains and three-eighths nearly: but the average of several gold and silver jehalis of Akbar's reign, found in good preservation, gives 15.5 grains, which also agrees better with the actual masha of many parts of Hindustan. By this calculation the rupee originally weighed 174.4 grains troy, and was of pure silver or such as was esteemed to be pure. The same standard was adopted by the Emperor Akbar, and accordingly we find coins of Akbar's reign dug up in various places weighing from 170 to 175 grains. Cabinet specimens of Jahangir, Shah Jahan and Aurungzib, have also an average weight of one hundred and seventy five grains pure, and the same prevails with little variation up to the time of Mahomed Shah, in the coins of opposite extremities of the empire; or struck in the Subahs, of Surat, Ahmedabad, Delhi and Bengal, as in the Akbari, Jahangiri, Shah Jahani, Delhi Sonat: Delhi Sonat Alingir: Old Surat Rupee: Murshidabad, Persian Rupee of 1745: Old Dacca Mahomed Shahi, Ahmad Shahi and Shah Alam of 1772. The Moghul emperors thus maintained a great uniformity in the currency of their vast empire, and they were very tenacious of their privilege of coining. On the breaking up of the empire in the reigns succeeding Mahammud Shah, numerous mints were established by Ministers and by the Viceroy of the principal Subahs, who were assuming independence, and the coin was gradually debased as the confusion and exigencies of the time increased. The Maratti and other Hindu states also established mints of their own, retaining, for form sake, however, the Emperor's name and superscription, as a titular avowal of Delhi supremacy. As the English dominion spread, these differences gave rise to the difference in the currencies of the English provinces, and by a happy chance brought those of Madras, Bombay, Farrukhabad to a close approximation. Regulation XXXV. of 1793, was the first of those of the Company which treats of mint matters. At that time, the differences in the values of the currencies were very great, but the dates of the coinage on each coin facilitated the work of the Sirrafs or money-changers in applying the batta to which the known debasement of each coin entitled it. In 1793, the Company resolved to remedy the inconveniences which had thus arisen, by declaring that all rupees coined for the future should bear the impression of the 19th year of

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Shah Alum, and thus by its adoption at that early period, it happened that the Sikha rupee was the only one of the Company's coins which retained the full value of the original Delhi rupee. About the same time, the Surat rupee of the Moghul Emperor, weighing 178.314 grains, was adopted as the currency of the Bombay Presidency. It contained 172.4 pure, and was thus nearly equal to the Delhi rupee. From depreciations made in the Surat coin, by the Nawab, the coinage at Bombay ceased for 20 years, but in 1800, the Surat rupee was ordered to be struck at Bombay, and from that date it became fixed at 179 grains weight, 164.74 pure, and the Muhr was equalised in weight thereto. Lastly in 1829, under orders from the Home Government, the currency of the Western Presidency was equalled with that of Madras by the adoption of the one hundred and eighty grain rupee and muhr. The Arcot rupee, in 1788, still retained 170 grains of pure silver, and subsequently when coined at the mint of Fort St. George, it had a weight of 176.4 grains or 166.477 grains pure, until the new system was introduced in 1818, and the Madras one hundred and eighty grain rupee was established.

The former inscriptions upon the Company's gold and silver coins were in Persian, as follows.

*Obverse* of the Sikha rupee struck at the Calcutta mint.

حامی دین محمد سایه فضل اله سکه زد  
بر هفت کشور شاه عالم بادشاه

Hami-i-deen-i-Mahomed, Sayah-i-Fazl Oollah Sikkah zad bar haft Kishwur Shah Alam badshah. Defender of the Mahomedan faith, reflection of divine excellence, the King Shah Alam, has struck this coin to be current throughout the seven climes. *Reverse*.

ضرب مرشد آباد سنه ۱۹ جلوس میمنت  
مانوس

Struck at Murshidabad in the year 19 of his fortunate reign.

On the rupee of the Western Provinces, coined at the late mints of Farrukhabad and Benares, and at the Sagar mint, the obverse had the same inscription, but on the reverse the date and place of coinage was different.

ضرب فرخ آباد سنه ۴۵ جلوس میمنت  
مانوس

Struck at Farruckhabad in the year 45 of his prosperous reign.

The Madras Rupee had a dotted rim on the face, and an indented cord milling: that coined in Calcutta had an upright milled edge: it has the symbol of a rose on the obverse. The inscriptions are as follows:—

سکه مبارک بادشاه غازی عزیزالدین  
محمد عالم گیر

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The auspicious coin of the warrior King Aziz ood Deen Mahomed Alungir. (the father of Shah Alum).

ضرب ارکات سنه ۲۰ جلوس میمنت مانوس  
Struck at Arcot in the 20th year of his auspicious reign.

The Bombay coin had a plain edge and the following legend.

سکه مبارک شاد عالم بادشاد غازی ۱۲۱۵  
The auspicious coin of the warrior King Shah Alum, 1215.

ضرب سورت سنه ۱۴۶ میمنت مانوس  
Struck at Surat in the 46th year of his propitious reign.

As before explained, the Bombay, the Madras, and the Farrukhabad or Sonat rupee had fortuitously happened to be of nearly the same intrinsic value.

	Pure contents.
Arcot rupee .. .. .	165 grains.
Bombay rupee ... .. .	164.7 „
Farrukhabad rupee ... .. .	165.2 „

The alteration of the standard of purity in 1813, did not affect the proportion of pure metal, and when the Sagar mint was established in 1825, it was ordered to coin the new Farrukhabad rupee of 120 grains weight the same as the standard of Madras, or containing 165 grains pure.

The inscriptions on the Current Company's now Her Majesty's Silver Rupee are as follows—  
Obverse. Victoria Queen.

Reverse. East India Company, 1840. One Rupee

It is milled upright on the edge.

(2767) *Masha*. Hind. A weight in India varying from 14.687 to 18.5 grains troy: the average being 15½ grains. The rupee of Akbar which was based upon that of Shir Shah weighed eleven and a half mashas.

(2768) *Muhr* or Mohur from Muhr, Hind.; a seal, is a gold coin of value fifteen or sixteen rupees.

(2769) *Nepal coins*. Nepal was conquered by the Goorkhas in the Newar year 883, corresponding with A.D. 1768. Prior to this epoch, the valley of Kathmandu was divided into three sovereignties, Patan, Bhatgaon and Kathmandu, each governed by a Rajah. Hence on the Newar coins, three series of Rajas names are found, those of Bhatgaon being generally distinguished by a shell; those of Patan by a tirsool, and those of Kathmandu by a sword.

The old coins of the Mals or Newar Rajahs, are much valued for their purity, and are worn by the women, strung to necklaces or armlets, as tokens in memory of their ancestors.

All money current north of the valley of Nepal, as far as the boundaries of Chinese Tartary, was formerly coined by one or more of the Ne-

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pal Rajahs, this was a source of considerable profit to them, the Bhooteahs giving them weight for weight in silver and gold dust: but Ranjet Mal, the last reigning Raja of Bhatgaon, sent them such base coins as to occasion a decrease of nearly one half of their intrinsic value, which was no sooner discovered by the Bhooteahs than a desertion of the mint took place, and there has been no more Bhote coinage made in Nepal. The Bhooteahs who now visit Nepal for trade, profit by this spurious coin, which they take in exchange for their goods at five gandas per muhr, and they pass off in their own country as of full value or ten gandas. As the Bhooteahs have no other currency they are compelled to cut them into halves, quarters, and eighths. They are the only coin current in Lassa.

The Nepalese procure all their silver from China, in the form of stamped lumps, as they are current in Lassa: for the Tibetans generally follow the Chinese custom in their money transactions, of paying and receiving by weight, and the merchants carry scales with them for the purpose. Since the Goorkha conquest the Vikrama era, has superseded that of Newar for ordinary purposes, and the Saka, commonly used in Hindustan, has been introduced upon the Nepalese coins.

(2770) *Pagoda*. A Portuguese appellation of a gold coin, the Hun, derived from the pyramidal temple depicted on one side of the coin. The proper Hindu name is Varaha "wild boar," and doubtless originated in a device of the Boar incarnation or Avatar of Vishnu upon the ancient coinage of the Carnatic, for the same figure appears as the signet of the Rajas of that country, in some old copper grants of lands in the Mackenzie collection. The Hindu name probably varied according to the image of the coin: thus we find the Rama tanka having the device of Rama and his attendants; and the Matsya Hun of Vijayanuggur with four fish on the obverse. Other Pagodas have Vishnu, Jagannath, Venkateswar, &c., on them: those with three Swamis or figures are of the best gold, and are valued ten per cent. higher than the common pagoda. Hun is the common term used by the Mohamadan writers, and indeed generally by the natives, for the pagoda. It signifies "gold" in the old Carnatic language.

The Hun was subdivided into fanams and kas. Fanam or more properly panam is identical with the word pan, known in Bengal as one of the divisions of the Hindu metrical system, now applied chiefly to a certain measure of kauris and copper money. The old fanam was of gold only, and was the one-sixteenth of a hun. In the Lilavati we find 16 pana = 1 dharan;

16 dharan = 1 nishk,  
where the dharan (or dharam) seems to accord



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with the hun, which is identical in weight with the Greek drachma. The Ikkeri Pagoda contains sixteen fanams: that of Vararai and Anandru, fourteen, and the Kalyan Pagoda twenty-eight. The division adopted by the English was forty-two.

(2771) *Pai*. پاي Hind. A small copper coin in Indian currency, the third part of a pice and twelfth part of an anna.

(2772) *Pice*. پيسا *Paisa*, Hind. A copper coin, the one fourth part of an anna.

(2773) *Panna*. The standard of Panna under the Peishwa, was called the Ankusi rupee from انكس *Ankus* the instrument used by the Mahout to guide the elephant; probably a symbol marked on the coin.

(2774) *Parthian or Arsakian Monarchy*. This was erected by Arsaces, who filled the office of Satrap in Bactria, in the year 256 B.C. Vaillant wrote a history of this powerful dynasty and endeavoured to classify the coins of the twenty-nine Arsacidæ kings. It was subsequently absorbed in the Persian Empire in the reign of Alexander Severus, A.D. 226. Their coins have often been found in Southern Asia, the greater number having the Greek word *Arsakoy*, with different epithets.

(2775) *Persian Ancient coins*. According to Marsden, it was not until the Kalifat of Abdool-Malik, in the year of the Hijra 76, (A.D. 695) that a distinct coinage was instituted with a view of superseding the currency of Greek or Byzantine, and Persian, gold and silver.

(2776) *Pool*. پھول *Pehlvi* or پول *Phool*, Parsi. Obolus et res quævis obolo similis ut squama piscis, simil. فلووس (falooos) Borhani Katin. Inde پھولي Be Poollee: Abul-ool-Malik, n. c. Pecuniæ defectus." Abul Fazl says that the پول Pool of olden days was equal to four tolas, Ferishta again gives 1 or  $1\frac{3}{4}$  tolas.

(2777) *Rati*. رتي Colonel Anderson, considers the rati may be assumed as high as 1.93 grains, and the masha at 15.44 grains.

*Rupee*, روپيه *Rupiya* Hind. A silver coin current in India value about two shillings: it derives its name from the Sanscrit.

(2778) *Sanat*. سنه Arab. year, generally used in coinage.

(2779) *Sikka*, سكه Hind. A coining die, applied to a coin formerly current in India.

(2780) *Thibet*. Mr. Cosmo de Koros states that the English rupee circulates freely through Western Thibet. The common Chinese brass money, with a square hole in the centre, is like-

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wise current in Lassa, as generally through the whole of the Chinese empire.

(2781) *Tola*. تولا Hind. A weight in India, equal to 180 grains troy, the weight of the present rupee.—*Prinsep's (Thomas,) Indian Antiquities, Vol. I, pages 1, 2, 10, 17, 18, 21, & 40. Vol. II. pages, 3, 4, 8, 11, 21, 22, 31, 32, 33.*

(2782) *SHAH-ZOUNG*. BURM. ALOE. This occurs in many varieties, and is used in Burmah both for medicine and chewing with the betel.—*Malcom, V. 1. p. 183.*

(2783) *SIALKOT*, one of the most ancient of forts and cities of the Punjaub was founded by Rajah Sala Byne or Salivahanna, father of Rusaloo. The fort, which adjoins the city to the westward is a high, oblong mound, with rectangular defences of curtains and round towers, massively built of brick and mortar. Bactria or Indo-Greek coins are found in the ruins, but not in any numbers. The commonest perhaps is the copper coin of Apollodotos.—*Beng. As. Soc. Jour. No. of 1854 p. 146.*

(2784) *SILK COTTON TREE*. *Bombax ceiba*.

(2785) *SINAPIS*. The following species are cultivated at the Saharunpore gardens.

(2786) *Sinapis brassica*.

Kurm Kulla. | Badshahee Rai.

(2787) *Sinapis dichotoma*.

Suhota. Sighla. | Torcea Kalee Surson.

Much prized for its oil.

(2788) *Sinapis erysimoides*.

Race. | Mukura race.

(2789) *Sinapis juncea*.

Bunga Surson.

(2790) *Sinapis nigra*.

Race.

(2791) *Sinapis Rajika*.

(2792) *Sinapis ragosa*.

Bhoteah Race. | Badshahee Race.

(2793) *Sinapis Sinensis*. Tarantula mustard of Hindustan.

Surshuf.

(2794) *SINGAPORE*. This island consists of a number of low hills and ridges with narrow and rather swampy flats intervening. In several places the sea-face is elevated but the greater portion of the circumference is fringed by a pretty deep belt of mangrove forest. Bukit Timah is a granitic hill, about 530 feet high, but the rest of the island is composed of sedimentary rocks, amongst which sandstone occupies a prominent place. There are other elevations, on the island known as Oxleys, Scotts, Guthries, &c

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hills. Singapore was first settled in A. D. 1160, by Sri Sura Bawana. From an inscription, now destroyed on a sandstone rock on a narrow point to the left of the entrance of the Singapore river, it would appear that Raja Suran of Amdan Nagara after conquering the state of Johore with his kling or Coromandel troops proceeded to Tamask, about A. D. 1201, returned to kling or Bejaneegar, and left this stone monument. Tam Sack is also called Singapura—*Pages 83 to 90 of No. III. Sept. 1847 of Jour. of Ind. Arch.*

The Census of Singapore, in November and December 1849.

Europeans.....	360	Jews.....	22
Eurasians.....	992	Malays ..	12,206
Armenians.....	50	Natives of India..	6,261
Arabs.....	194	Parsees.....	23
Balinese .....	149	Siamese.....	5
Boyanese.....	763	Military.....	609
Bugis .....	2,269	Convicts.....	1,548
Caffries.....	3	In Ships .....	2,995
Chinese .....	27,988	Others.....	1,000
Cochin Chinese...	27		
Javanese... ..	1,649	Total... ..	59,043

The gross value of the Imports and Exports at Singapore at stated intervals, during the 31 Official Years 1825-26 to 1854-55, was

Years.	Imports.	Exports.	Grand Total.
	£	£	£
1825-26.....	1,407,465	1,202,975	2,610,440
1830-31.....	2,000,373	1,948,406	3,948,784
1835-36.....	1,654,089	1,562,864	3,216,953
1840-41.....	3,178,543	2,673,381	5,851,924
1845-46.....	2,895,227	2,356,872	5,252,099
1850-51.....	3,085,587	2,551,700	5,637,287
1854-55.....	3,976,280	3,409,934	7,386,214

Singapore is a free port, the only charges being the Straits Light Dues, which are one anna or  $2\frac{1}{2}$  cents per registered ton on merchant vessels. All national ships are free of this also.

In Singapore *Measures of capacity* are rarely used, and these only with certain articles, such as tobacco, &c.

16 taels make 1 Catty equal to 1lb. 5oz.  $5\frac{1}{2}$  grs. or  $1\frac{1}{2}$ lb. avoirdupois.

100 Catties, make 1 (Chinese) picul= $133\frac{1}{3}$  lbs. avoirdupois.

40 (Chinese) piculs, make 1 royan.

2 (Malay) piculs make 1 Char.

The Malay Catty weighs 24 Spanish Dollars.

The Chinese Catty weighs  $22\frac{1}{2}$  Spanish Dollars.

Rice is sold by the Royan of 40 piculs. The

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native Merchants buy imported produce from the islands by the Malay picul, but sell it by the Chinese picul. Trains young America.

*The number of Nutmeg Trees in Singapore residency, their produce and value was in 1848, as follows.*

PROPRIETORS.	No. of plantations.	Total No. of Trees	No. of bearing Trees.	Annual produce in No. and quantity.	Annual produce in weight.	Gross annual income.
Wm. Cuppage....	1	1,200	847	225,140	15 $\frac{2}{100}$ pls	900 56
Dr. Oxley.....	1	4,000	2,300	1,400,530	...	5,600 12
Dr. Montgomerie	1	2,175	1,361	719,018	...	2,876 ..
C. R. Prinsep....	1	6,700	5,100	1,452,862	100 do	5,000 ..
Government .....	1	778	350	283,506	...	1,134 ..
A. Guthrie.....	1	2,250	700	368,290	...	1,473 16
Joaq. d'Almeida.	1	1,100	975	478,675	...	1,914 70
Dr. Martin .....	1	1,530	720	398,951	26	1,589 80
Wm. Scott.....	1	5,200	1,700	579,512	...	2,370 48
T. Hewetson....	1	2,000	850	597,175	44 $\frac{2}{100}$ do	2,388 70
A. Spottiswoode..	1	3,009	1,200	143,106	...	470 64
J. Gemmill .....	1	593	225	19,000	2 $\frac{1}{100}$ do	151 80
J. d'Almeida, Sr.	1	4,000	350	1,408	...	5 63
J. d'Almeida, Jr.	1	1,000	250	80,575	...	322 30
C. Carniac (Grove)	1	870	250	131,915	...	527 66
Do (Cairn Hill)..	1	3,500	500	221,443	...	885 77
Syed Ally.....	1	640	43	15,000	1 $\frac{1}{100}$ do	67 80
•	17	40,545	17,721	7,116,105	6	27,679 12
Others.....	41	30,855	3,100	500,000	...	2,000 ..
Total.....	58	71,400	20,821	7,616,105	6	29,679 12

From the above table we find that Singapore nutmegs average 14,533 nuts per picul being the mean of Messrs. Cuppage's, Martin's and Hewetson's plantations, and that the annual produce of the bearing trees is 366 nuts per tree or  $2\frac{1}{2}$  catties or  $3\frac{1}{2}$  lbs, but it must be observed that a great majority are only coming into bearing. For an estimate of the weight of Pinang nuts it will be found from the data above given regarding that settlement for 1842 that in that settlement—there are 246 nuts to a tree which according to Mr. F. S. Brown's data hereafter given will make  $1\frac{1}{2}$  catties per tree or 2 lbs, but the same remark is applicable to Pinang that the majority of the trees were young. —Page 31.



## SLOKA.

Locality.	Total No. of Trees.	No of bearing Trees.	Amount of produce in lbs	In pls. and cts.	Price per pl.	Gross value.
Singapore...	71,400	20,821	70,032	525,24	60 drs.	31,51,400
Penang.....	286,505	118,278	236,557	1,77,418	60 drs.	10,645,080
English.....	357,905	139,099	306,589	2,29,942		13,796,480
Banda.....	662,000	522,222	700,000	5,22,200	60 drs.	31,332,000
Bencoolen....	60,000	50,000	66,666	49,999	60 drs.	29,99,940
Dutch....	682,000	572,222	766,666	5,72,199		34,331,940
English and Dutch.	1,039,905	711,321	1,073,255	8,02,141		47,128,020

In estimating the mace it may be assumed at the weight of nutmegs—as follows.

English 574 pls 85 cwts at 70 dollars,	Sp Drs.	Cents.
Dutch 1430 „ 49 „ at 70 dollars,	40,239	50
	100,134	30

Total value of Mace Sp. Dollars, 140,373 80

*Jour. of the Ind. Archipelago, Jan. 1850, p. 32.*

(2795) SINGHPO. This is merely the word, for *man* in the languages of the tribes to whom it is applied. The great nursery of these tribes is along the Sgin-mae-kha, or great eastern branch of the Irawaddi. The wilder tribes are styled Khakhyens or Kakoos, and these sweep down on the Shan villages on which they exercise the greatest cruelties.

(2796) SITANG. The name of a river and valley of Pegu. The whole extent of the valley is about 350 miles of which one half lies within the British provinces of Pegu and Martaban.

(2797) SLOKA. This is a Hindu or Sanscrit word, a stanza, verse, &c., and probably the Malayas derived the term for their poetry styled "*Shair*" from the Arabs, and that of "*SLOKA*"

## SNAKES.

not so easily decided from its name, the word used here is *بربيت* Bar-beit which is from the Arabic bait بيت a couplet, but perhaps pantun itself is a Mlayan word.—*Jour. Ind. Arch. Vol. V. No. XI.*

(2798) SNAKES, remarks Viscountess Falkland, are really sensible to the charms of music. Educated snakes, who have been for sometime in the hands of a snakecharmer, are, of course, more susceptible than wild ones, and manifest their pleasure with less reserve, possibly, because they have become used to the musician's appearance, and are less inclined to try to escape, which would probably be the first impulse of the wild one. But all the family have naturally a taste for music, which may be proved by any one who has kept one of the harmless English snakes as a pet. The animal will always pay attention to any rather monotonous tune played on a flute or flageolet. This taste, by the way, is shared by many of the lizard tribe, by some pigeons, and very generally by hedgehogs; at least I have known three or four instances of it on the part of a hedgehog, kept in the lower story of a house, as an exterminator of blackbeetles and cockroaches. If after nightfall, when the hedgehog generally awakes and runs about in search of prey, he heard the sound of a violin or piano, he would always endeavour to make his way to the place whence the sound came, and if admitted into the room where the instrument was, he would stand entranced as long as the music continued. I mention this merely as a proof that several of the lower animals are attracted by music. But as regards Indian snakes, I have seen cases in which I had no room to doubt that the charmer, by his monotonous piping and drumming, did tempt really wild snakes from their hiding places. It is not often, however, that the charmer trusts entirely to his music. I have known them, when sent for to catch a large, and apparently very dangerous cobra, which had a hole in a dry stone wall, inconveniently near a gentleman's house, come provided with a tame cobra, whose fangs had been extracted. The cobra, was carried in a bag, very cleverly concealed under the arm of one of the charmers. The musician commenced piping, and all the spectators naturally directed their attention to him. He walked along the wall, and when he got near the supposed hole, piped more vigorously than before, and directed his own eyes and those of the spectators to a particular spot. On a sudden his accomplice gave a loud cry, and on looking at him, he was seen on the ground, grasping the neck of a large cobra, which he appeared to have seized as it was in the act of issuing from a hole in the wall, and whose tail was twisting round the man's arms and body. The other charmers came to his aid, and the snake was at length duly

“The imposture was discovered by the gentleman who owned the house insisting on shooting the snake. The charmers remonstrated, said ‘it was their god, had come out in consequence of their invocations, and would, if killed, haunt and ruin them, &c. The gentleman was obstinate, but at last told the charmers he would spare their snake, if they confessed the cheat he suspected. This they did, and showed him the bag in which the reptile had been concealed under the arm of one of their number, and satisfied him that the snake was destitute of fangs, and must therefore have been previously caught, and deprived of his weapons of offence.

“There is much which our philosophy has yet to learn, relative to the habit and tempers of these reptiles, and there is no doubt that there are particular individuals who are very little obnoxious to snake bites; just as there are particular people whom bees will never sting. She learned two very decided and well authenticated instances of this. One was a halfwitted boy of the wild tribe of Bheels, in Candeish. He was found by his relations playing with wild snakes, and had the power of attracting and taming them. He had numbers of all kinds of snakes in the jungle, near the hut where his parents lived, and these snakes would come to him and allow him to handle them with impunity. After some months he began to be known to the people round about as a prodigy, but as the part of the country where he lived was very remote, it was long before his fame spread to any distance; and soon after he had been heard of by the government officials, and official enquiry had been made to an extent sufficient to verify the main facts of the story, the poor boy was bitten by one of his favourites and died. “The other case occurred in the Sattara territory, about twenty-five years ago. It was noised abroad that the son of a Brahmin, not far from Waee, had the power of attracting the most venomous snake, and handling them with impunity. Numbers visited him, and seeing the story was true, spread his fame, and his relations finding that his reputation was likely to be profitable to them, added all sorts of marvels to the current tales. He was one of the promised avatars of the god Crishna, which are yet to come. He was to restore Hindooism in its purity, and re-establish Brahminical superiority in the Deccan. Thousands flocked to see him, and pay their respects, and bring oblations; and so great was the excitement, that the Raja of Sattara and the English Government officials got alarmed. The poor boy however, like the Candeish Bheel, was not permanently proof against snake bites, and was bitten and died just when his village had become the point to which every devotee in the Deccan was hastening, and the excitement subsided as quickly as it arose.

“It may be mentioned that a snake visiting

a house is always looked on as a sign of luck; and when a snake discovers how to get at the eggs and milk in the larder, no native will on any account, kill what he regards as the good genius of the house” — *Chow-Chow*, page 54.

(2799) SOLIMAN. A Mahomedan merchant who voyaged to India and China, in the beginning of the ninth century. His principal establishment was probably at Busrah.—*India in the 15th Century*.

(2800) SOLOR, is an island lying to the east of Flores and to the north of Timor, under which Presidency it is placed. The inhabitants of the coast of this island are Mahomedans in name, but they are nevertheless hard arrack drinkers, and gain their livelihood by fishing, the produce of which they exchange with the mountaineers for maize, the production of the ground, which the population cultivate for their subsistence, the soil there being of too volcanic a nature to grow rice.

These inhabitants of the shore are hardy mariners and fishers, and think nothing of approaching the whale with their little boats, eight feet long, to attack the unwieldy monster and tow him to the shore. The village which most applies itself to the whale fishery is Lamakera on the north east part of the island of Solor, and lying within the Strait. It is the largest, most prosperous and most populous. The four other Mahomedan villages are Layayong, Andanara, Lamahala and Trong, which three last are situated on the island Andanara.—*Journ of the Indian Archipelago*, December 1850, p. 767.

(2801) SOO-BAN. BURM. Is a shrub exceedingly prized by the Burmans, as yielding the best red dye of any wood they have. It is sold at a tical per viss, and seems rather rare. The leaves are a favourite article for curry.—*Malcom Vol. I. p. 191*.

(2802) SOREX. THE SHREW. The following Memoir on the Indian species of Shrews is from the pen of Edward Blyth, Esquire. As an incentive, he says, to the investigation of some of the most imperfectly known of Indian mammalia, and not the most inviting of groups to amateur students, we shall here endeavour to bring together, and to reduce or digest into intelligible form and order the scattered materials available for a Monograph on the Indian Shrews. It may lead to the discovery of additional real species, and probably to the diminution of the number of present supposed species; besides conducing to the further elucidation of those at present known and recognized, and especially to a better knowledge of the extent of their geographical distribution.

In general, the Shrews of tropical and subtropical countries are distinguished by their comparatively large size, and slaty hue of every shade from pale grey to black, with rufous tips to the



## SOREX CÆRULESCENS.

fur more or less developed, though in some scarcely noticeable; [Note. In at least some species, the rufous tips would appear to increase with age; and, to a considerable extent, the colour of these animals is darker, according to the increase of altitude inhabited by a species.] The ear-conch is conspicuously visible above the fur; the tail thick, tapering, and furnished with scattered long hairs, which certain species also exhibit upon the body; and the teeth are wholly white. [Note. While preparing this memoir, we discovered a remarkable exception in the instance of *SOREX MELANODON*, N. S.] and of the following type of structure. The superior front-teeth or *quasi-incisors* (vide J. A. S. XX, 164), are large and strongly hooked, and much longer than their posterior spur; while the inferior have rarely so much as a trace of serrated upper edge: of four upper præmolars anterior to the *canassiez*, the first is large, the second and third are much smaller, the fourth is diminutive, and the third exceeds the second. This group of Shrews is familiarly exemplified by the common large musk Shrews of Asia and Africa, and constitutes the restricted *SOREX*, L. (v. *Pachyura*, de Selys Longchamps.) [Note. Certain small species of temperate climates were detached by Wagler from the ordinary Shrews of those climates (with pious tipped teeth, &c.) by the name *CROCIDURA* (v. *Suncus*, Ehrenberg, apud Gray); e.g. *S. ARANEUS LECCODON*, *S. ETRUSCUS*, &c., but we are not aware that these are separable from the above; and certainly the various Pygmy Shrews of India are typical *SORICES*, except that some only of them want the odoriferous glands on the sides of the body.

N. B. In the 'Report on the Quadrupeds of Massachusetts,' published by the Government Commissioners of the Zoological and Botanical Survey of the State (Rs. 40), the extraordinary statement is made by Mr. E. Emmons, that "In the specimens of *Sorex* which have fallen under my observation, I have not been able to discover, even with the microscope, any nostrils, the termination (or the extremity) of the nose being apparently an imperforate membrane." Upon reading this, we examined several species (large and small) preserved in spirit; and easily detected a lateral valvular orifice, which, on pressure of the snout above, was shewn to be perforate by the fluid oozing through. Could Mr. Emmons have tried so simple an experiment?

The Indian species are as follows.

(2803) *SOREX CÆRULESCENS*, Shaw.

*Sorex Pilorides*, Shaw:

*Sorex Giganteus* Is. Geoffroy.

*Sorex Murinus*, L., apud Gray: figured in Hardwicke's *Ill. Ind. Zool.* as

*Sorex Myosurus*, Pallas; whence probably

*Sorex Myosurus*, apud Walker, in *Calc. Journ. Nat. Hist.* III. The common Musk

## SOREX CÆRULESCENS.

Shrew, or (*vulgo*), 'Musk Rat,' of Bengal, &c. (but very different from the 'Musk Rat' or *Muskquash*—*FIBER ZIBETICUS* of N. America, which is a rodent nearly affined to the *Voles*—*ARVICOLA*).

This animal is described by Mr. Hodgson in the *Ann. Mag. N. H.* XV, 269 (1845); but the length of the tail (as given),  $3\frac{1}{8}$  in. is possibly a misprint for  $3\frac{5}{8}$  or  $3\frac{7}{8}$  in., or more than half of the length of the head and body, which is given as 6 in. Number of caudal vertebræ, 24. Total length of skull of adult male, with front-teeth *in situ*, somewhat exceeding  $1\frac{1}{8}$  in.; of female, somewhat under greatest breadth of skull of former,  $\frac{1}{8}$  in.; of latter,  $\frac{5}{8}$  in. Colour uniform pale grey, slightly tinged with ferruginous, and more conspicuously on the lower parts; the naked parts flesh-coloured.

This is the common large Musk Shrew of Bengal, Nepal, and we believe the valley of Assam; becoming rare in Sylhet; and wholly disappearing in Arakan. In Nepal, Mr. Hodgson styles it "the common house Shrew of the plains, and also of the hills, up at least to 6000 feet." We have seen specimens from the neighbourhood of Agra: but whether, it be the common Musk Shrew of S. India is doubtful on present evidence; though Dr. Kelaart's description of the Cinghalese animal corresponds. It certainly does not appear to inhabit the eastern coast of the Bay of Bengal, from Arakan to the Straits of Malacca. Dr. Horsfield gives as its habitat "India generally, and the eastern islands;" and he notes a specimen from Butan, presented to the India-house collection by Major Pemberton. 'We' suspect that its reputed existence in the Malay countries, needs confirmation.

In addition to the names above cited, Dr. Gray, in his Catalogue of the specimens of mammalia in the British Museum (1843), refers the following name and synonymes to this species.

*Sorex Murinus*, L.:

*Sorex Myosurus*, Pallas:

*Sorex Indicus* et *Capensis* Geoffroy.

*Sorex Sonneratii*, Is. Geoffroy:

*Sorex Crassicaudatus*, Lichtenstein:

*Sorex Nipalensis*, Hodgson, and

*Sorex Moschatus*, Robinson.

The last two are merely MS. names; and indeed the Zoological appellations in Mr. W. Robinson's 'descriptive account of Assam' are given pretty much at random, and would establish a most extraordinary community of species among the mammalia of that country and of Europe! He gives, "Genus *MYGALE*, *Sorex Moschatus*, Cuvier. The common Musk Rat." Now *Sorex moschatus*, L. (nec. Cuvier), is the type of the genus *MYGALE* of Cuvier; altered to *MYOGALEA*, Fischer (*Myogale* apud Ruppell), because pre-occupied by Linnæus for a well known genus of Spiders; and *Myogalea*

## SOREX INDICUS.

**MOSCHATA**, is a Russian animal, generically differing from Mr. Robinson's Musk Shrew. Nevertheless, his adoption of the term *moschatus* would seem to indicate the rankly smelling *S. Cærulescens*, rather than *S. Murinus* (v. *myosurus*), which is the only Shrew mentioned in Prof. Walker's list of the mammalia of the same province.

(2804) **SOREX INDICUS**, Geoffroy, v. *S. Sonneratii*, Is. Geoffroy, is accepted as a distinct species from *S. Cærulescens* in Dr. Horsfield's Catalogue of the specimens of Mammalia in the India House Museum (1851); and a specimen is noted from the Dukhun, presented by Col. Sykes, and the following habitat given for the species - "Continent and islands of India." Col. Sykes terms it the Cheechonder of the Mahrattas; being the same name which is applied to *S. Cærulescens* in Bengal, spelt *Choochundr* by Dr. Cantor (*J. A. S.* XV, 191), and the latter author gives "*Chinchorot* of the Malays of the Peninsula" as the name of the very distinct species referred by him and others to *S. MURINUS*, L.; which latter was originally described from Java. According to Colonel Sykes, these troublesome and disagreeable animals are very numerous in Dukhun, but much more so in Bombay. The sebaceous glands in an old male were observed to be very large, and the odour of musk from them almost insupportable; while in an adult female the glands were scarcely discernible and the scent of musk very faint. It is tolerably strong in the female of *S. Cærulescens*; though more or less so, perhaps, with reference to sexual condition. "The **SOREX INDICUS** and *S. GIGANTEUS*," it is added, "are regarded by Col. Sykes as specifically identical, he having killed them in the same room, and seen them frequently together." (*P. Z. S.* 1831, p. 99). Prof. Schinz accordingly assigns *S. GIGANTEUS*, Geoff. *Ann. du Mus.* XV. pl. 4, of 3, as a synonyme of *S. INDICUS*: but the reference is erroneous, the *Memoires du Museum*, tom. XV (to which we have not access), being probably intended. *S. GIGANTEUS*, Is. Geoff, *Voy. de Belanger*, refers to *S. cærulescens* of Bengal.

According to M. Isidore Geoffroy, the *S. INDICUS* (his *S. Sonneratii*) is a smaller animal than *S. Cærulescens* (his *S. Giganteus*), with tail forming always a *quarter* of the entire length. Length of the head and body of adult, a little under 4 in. (Fr). Fur ashy, washed with russet-brown; and pale ashy below. Inhabits the Coromandel coast, and also the Mauritius. If truly a distinct species from *S. Cærulescens*, its natural habitat is probably India: but we have vainly sought for information of such an animal.

In Dr. Ruppell's printed Catalogue of the specimens of mammalia in the Frankfort Museum (1842) examples referred to *S. INDICUS*, L. (Fr. *Cav. Mamm.* 11, t. 28), are noted from Java, and also from Massoua and from Suez; and a sup-

## SOREX MURINUS.

posed variety termed by him *S. INDICUS*, var.; *cinereo-ænea*, from Schoa: and he elsewhere suggests that these animals have probably been introduced by the shipping from S. E. Asia and its islands, and so found their way over to Schoa, where a different climate had affected the colouring of the fur. On ship-board they could of course subsist on *BLATTÆ*: but their presence (certainly that of the foetid *S. Cærulescens* of Bengal) would scarcely escape remark, the more especially as that of a single individual might seriously damage a whole cargo; besides the obvious necessity of both sexes being required to continue the race, a condition most likely to be fulfilled by the conveyal of a pregnant female with her future litter 5 or 6 in number.

(2805) **SOREX CRASSICAUDUS** (nec *crassicaudatus*), Lichtenstein, refers to a Musk Shrew inhabiting Egypt, and stated to be common about Suez; which may therefore be presumed identical with Dr. Ruppell's *S. INDICUS* from Suez; and the description certainly seems to approximate that of *S. Cærulescens* (length  $5\frac{1}{2}$  in.; tail  $2\frac{3}{4}$  in.): and *S. CAPENSIS*, Geoffroy, is termed *S. FRANCICUS* by Prof. Schinz, who gives Mauritius as its habitat (length 3" 8"; tail 1" 9"). The most notable identification is that of Dr. Ruppell's specimens from E. Africa and from Java, presuming the latter to be really from that island.

(2806) **SOREX MURINUS**, L. *S. myosurus*, Pallas: *S. cærulescens*, var., Raffles: *S. Griffithii* (?); Horsfield: the common Malayan species originally described from Java, and by Dr. Cantor in *J. A. S.* XV, 191, and thus denominated by him after Prof. Schinz (*Synopsis mammalium*), who states it to inhabit Java, Sumatra, Borneo, Celebes, Amboyna, Japan, Bengal, Abyssinia, and the Cape of Good Hope. We have italicized the habitats which probably need verification: and the Society possesses specimens from the Arakan and Khásya hills, which accord with Dr. Cantor's description, *l. c.*; but less so with M. Geoffroy St. Hilaire's figure, in the *Annales du Muséum d' Histoire Naturelle*, tom. XVII, pl. 3, f. 2, which may nevertheless be intended to represent the same species. As compared with a mature female from Arakan, taken out of spirit, the ears in M. Geoffroy's figure are represented too small, and neither the snout nor tail is sufficiently elongated. Length of this Arakan female—head and body 5 in., and tail 3 in.: hind-foot (with claws)  $\frac{7}{8}$  in. Unfortunately, we have no Malayan specimen for actual comparison: but there is every reason to suspect that this species replaces *S. Cærulescens* along the whole eastern coast of the Bay of Bengal, and thence through the hilly country northward, to that skirting the valley of Asam. Dr. Horsfield



## SOREX SERPENTARIUS.

mentions a Nepalese specimen, presented to the India House museum by Mr. Hodgson: but this species is unnoticed in the latter gentleman's Catalogue of Nepalese animals and especially in his descriptive notices of the Nepalese Shrews; *Ann. Mag. N. H.* XV, 269. With the exception of the small *S. TENUIS*, *S. Muller*, from Timor, it appears to be the only well established species of Shrew throughout the great oriental Archipelago. In the Tenasserim provinces, the Rev. J. Mason states—"We have at least two species of Musk Shrew, both of which emit an offensive odour." (*Qu.* *S. MURINUS* and *S. SERPENTARIUS*?) In *S. MURINUS*, according to Dr. Cantor, "the smell of musk, emitted by the adult animal, and which in the young is barely perceptible, is much less intense than in the Bengal Musk Shrew." *S. SERPENTARIUS*, according to Dr. Kelaart, has a powerfully offensive musky odour. *S. MURINUS* has larger ears than *S. CÆRULESCENS*; and Dr. Cantor describes it as—"Dark brownish-grey above" beneath light brownish-grey. Feet and tail flesh-coloured in the living animal, changing to cinereous after death. In the young the colour is more of a bluish-grey, slightly mixed with brown on the back. A stuffed specimen from the Khasya hills has the fur longer and less dense than in *S. CÆRULESCENS*, the piles somewhat curly: and colour dark ashy at base, with rufous-brown tips which give the prevailing hue. A most obviously distinct species from *S. CÆRULESCENS*.

We suspect that *S. Griffithii*, Horsfield, of that naturalist's Catalogue of the specimens of Mammalia in the Honorable Company's museum, is no other than our presumed *MURINUS* from the Arakan and Khasya hills; although described from Afghanistan: because we saw a fine skin from Cherra Punji in the possession of the late Mr. Griffith, which was forwarded to the India-house by Mr. McClelland; and we have previously had occasion to remark that specimens of reptiles procured by Mr. Griffith in Afghanistan and in the Khasya hills, had manifestly become mixed and confounded; whence certain important mistakes concerning habitats. [Vide *J. A. S.* XXII, 413.] *S. Griffithii* is described to be allied to *S. MURINUS*; "but differing essentially by the uniform deep blackish-brown tint, and the shortness, delicacy, and softness of the fur. Colour deep blackish-brown throughout, with a slight rufous reflection in a certain light. Length of head and body,  $5\frac{3}{4}$  in.; tail  $2\frac{1}{2}$  in." Horsfield's Catalogue.

(2807) *SOREX SERPENTARIUS*, Is. Geoffroy: *S. Kandianus* Kelaart. Described in *J. A. S.* XXI, 350 from a skin sent by Dr. Kelaart as "the large godown Shrew of Kandy;" though scarcely corresponding with his indications, *J. A. S.* XX, 164. 185. A second skin of precisely the same species, and also an adolescent specimen entire in spirit, were

## SOREX NEMORIVAGUS.

subsequently forwarded from Mergui by Capt. Berdmore, as noticed in XXII, 412. In both adults, the tail (vertebræ) measures  $2\frac{1}{8}$  inch; and the head and body (allowing for some extension of the skin) about  $4\frac{1}{2}$  inch: "The Kandyan specimen is more rufescent than the others; but we can perceive no further difference whatever; indeed, to judge from the two Mergui examples, it would seem that this animal becomes more rufescent with age. Dr. Kelaart states that its odour is as offensive as that of the large Musk Shrew of Ceylon. The Coromandel coast and the Mauritius are given as its habitats. Colour duskyish-grey with dark rufous-brown tips to the fur, more or less developed according to age, and the under parts somewhat paler.

(2808) *SOREX SOCCATUS*, Hodgson, *Ann. Mag. N. H.* XV. 270. A Sikim specimen which we refer to this species, bears considerable resemblance to the last, but is a good deal darker, with well clad feet and tail; and the head and limbs are proportionally larger. Entire length of skull with front teeth *in situ*,  $1\frac{5}{8}$  inch; breadth  $\frac{9}{16}$  in., (nearly); entire range of upper teeth,  $\frac{5}{8}$  in., ditto of *S. Serpentarius*, barely exceeding  $\frac{1}{2}$  in. Tail (vertebræ),  $2\frac{5}{8}$  in.; compressed towards tip, which is furnished with a pencil-tuft of stiffish hairs. Mr. Hodgson thus describes his animal. "Size and proportions of *S. nemorivagus*, H. (nearly); but distinguished by its feet being clad with fur down to the nails, and by its depressed head and tumid bulging cheeks (mystacial region) Ears large and exposed. Colour a uniform sordid or brownish slaty-blue, extending to the clad extremities. Snout to rump  $3\frac{1}{2}$  in., tail  $2\frac{1}{8}$  in.; planta  $\frac{1}{8}$  in. This animal was caught in a wood plentifully watered, but not near the water. It had no musky smell when brought to me dead." Hab. Nepal and Sikim.

(2809) *SOREX NEMORIVAGUS*, Hodgson, *Ann. Mag. N. H.* XV. 279, Differs from the ordinary type "by a stouter make, by ears smaller, and less entirely nude, and by a longer and more tetragonal tail. Colour sooty-black with a vague reddish smear; the nude parts fleshy grey. Snout to rump  $3\frac{5}{8}$  in.; tail 2 in.; planta,  $\frac{1}{8}$  inch. Found only in woods and copices." Nepal, according to Dr. Gray, an example presented to the British Museum by Mr. Hodgson, as of this species, "is probably only a half grown specimen of *S. MURINUS*" (i. e. *CÆRULESCENS*)! [Note. We made a description of the identical specimen before it was taken by Mr. Hodgson to England; viz.—"Of a shining rufescent-brown colour, merely weaker on the under-parts. Length  $3\frac{1}{2}$  in.; of tail  $1\frac{7}{8}$  in.; fore-feet and claws  $\frac{7}{8}$  in.; the claws alone  $\frac{1}{2}$  in., and of a yellow colour, perhaps whitish in the fresh animal; hind-feet and claws  $\frac{5}{8}$  in."] The foregoing description should indicate a very different animal; but which might be mistaken for the young of *S. MURINUS* (*verna*), and such pro-

## SOREX PYGMÆUS.

bably is the supposed *S. MURINUS* from Nepal of Dr. Horsfield's Catalogue.

(2810) *SOREX HETERODON*, Blyth n.s. Very similar to *S. SOCCATUS* in general appearance, but less dark-coloured, with shorter fur, and pale instead of blackish feet and tail underneath; the feet, too, are broader, especially the hind-feet; and they have a hairy patch below the heel. The skull, of the same length as in *S. SOCCATUS*, and with equally large teeth, is much more narrow, and the upper quasi-incisors are conspicuously less strongly hooked than in that and other typical *SORICES*. From Cherra Panji, in the Khasya hills.

(2811) *SOREX NIGER*. *Elliot*; described in Dr. Horsfield's Catalogue (1851). "Length of the head and body  $3\frac{1}{2}$  in.; of tail  $2\frac{1}{2}$  in. Tail equal in length to the entire animal, exclusive of the head; gradually tapering to a point. Snout greatly attenuated. Colour blackish-brown, with a rufescent shade to the upper parts: abdomen greyish. From Madras', (*Qu. Madras Presidency?*).

(2812) *SOREX FERRUGINEUS*, Kelaart, *J. A. S. XX*, 185: *S. montanus* apud Blyth, (misled by a label), *ibid.* 163, vide *XX*, 350, note. Hab. Ceylon *N. B.* The dimensions of the specimen described in *J. A. S. XX*, 163, accord with those assigned by Dr. Kelaart to the next species; and he states that the two are nearly of the same size, and that the smell of the present species is very powerful.

(2813) *SOREX MONTANUS*, Kelaart (*nec* apud Blyth, *J. A. S. XX*, 163). Length of head and body  $3\frac{3}{4}$  in.; of tail  $2\frac{1}{2}$  in.; of hind-foot  $\frac{3}{8}$  in. Fur, above sooty-black, without any ferruginous smear; beneath lighter-coloured; whiskers long, silvery-grey: lower part of legs and feet greyish, clothed with appressed hairs. Claws short, whitish. Ears large, round, naked; the outer margin lying on a level with the hair of the head and neck, and being thus concealed posteriorly." Mountains of Ceylon ("the blackest Shrew of the highest parts of the island." Kelaart.)

Dr. Kelaart has lately forwarded an entire specimen in spirit of a young female Shrew found at Galle (!), though with the three pairs of inguinal teats well developed; which may prove to be the young of *MONTANUS*, but is perhaps distinct and new. If so, *S. KELAARTI*, Blyth. Colour uniform blackish above and below, slightly grizzled and glistening; the fur short and close, with scattered fine long hairs throughout (as described of *S. MONTANUS*). Length of head and body  $2\frac{3}{4}$  in.; of tail  $1\frac{1}{4}$  in.; and of hind-foot with claws  $\frac{5}{8}$  in.

(2814) *SOREX PYGMÆUS*, Hodgson *Ann. Mag. N. H.* XV, 269: *nec S. pygmaus*, Pallas: if the small European species referred by Schinz, Rüppell, and others to the latter be correctly identified, *S. PYGMÆUS*, Pallas, apud Schinz, is placed by the latter Zoologist among

## SOREX MICRONYX.

the species with brown-tipped teeth, and in the division of them which corresponds to *CORSIRA*, Gray; and the description—*caudâ basi contractâ auriculis brevissimis*;—will certainly not apply either to Mr. Hodgson's animal, or to various other minute Indian shrews hitherto undistinguished from it: and therefore Mr. Hodgson's name for the present species may stand, as he states the structure of the animal to be typical. Since writing the above, we have seen the figure of *SOREX PYGMÆUS*, Pallas and Laxmann (*S. minutus*, L., *S. exilis*, Gmelin, and *S. minimus*, Geoff.) in the *Act. Acad. Leop.* Vol. XIII, pt. 2, t. 25 (1827); and the species is widely different from all the pygmy shrews here described, and is evidently a *Corsira*. The following is his description—"snout to vent, less 2 in.; tail,  $1\frac{3}{8}$  in. head,  $\frac{1\frac{1}{8}}$  in.: palma,  $\frac{1}{4}$  in.: planta,  $\frac{3}{8}$  in. Structure typical, save that no odorous glands were detected, nor had the animal any musky smell. Colour sooty-brown, paler below. Naked parts of a dusky flesh hue. Hab. Nepal, where it "dwells in copices and fields, and is rarely found in houses."

Of numerous specimens of minute *SORICES*, from various localities, the only one which approaches to the above description is a species which we have just procured in Calcutta; curiously enough while engaged in the investigation of this particular group. It may be termed

(2815) *SOREX MELANODON*, Blyth, *n. s.*: from the remarkable colouring of its teeth, which are *piceous* and *white-tipped*; exhibiting thus the reverse coloration of those of *CORSIRA*, &c. Length of adult female  $1\frac{3}{8}$  in.; tail  $1\frac{1}{8}$  in.: hind foot and claws  $\frac{5}{16}$  in. Colour uniform fuscous, without any rufous tinge; scarcely paler below: the feet and tail subnude, save the usual scattered fine long hairs upon the latter; and, with the ears and snout, of a livid colour, paler below: claws white and distinctly visible. Procured by one of our museum assistants in his own house, where he states that he has observed and probably will obtain others.

(2816) *SOREX MICRONYX*, Blyth, *n. s.* length of head and body  $1\frac{5}{8}$  in.; tail somewhat exceeding  $1\frac{1}{8}$  in.: hind-foot and claws  $\frac{1}{2}$  in.: skull  $\frac{1}{2}$  in. teeth white. Claws with fine hairs impending them, and so minute as to be scarcely discernible without a lens. Fur of a paler and more chestnut brown than any other of these minute species examined, and also more silvery below. Feet and tail subnude, or thinly furred, shewing the colour of the skin through; browner above, whitish (or perhaps flesh-coloured) below. Of two specimens in our museum, one in spirit, the other now dried, the latter was obtained by the late Major Wroughton in Kemaon, the former by L. C. Stewart Esquire of H. M. 61st foot, at Landour; where he informs us he picked up many of them dead, on the surface of the snow during the severe winter of 1850-51.



## SOREX ATRATUS.

(2817) *SOREX PEROTTETII*, Duvernoy, Guérin's *Mag. de Zool.* 1842, livr. 8. We can only refer to Prof. Schinz's description of this species, which is as follows:—" *S. notæo saturate fusconigricante, gastræo canescente, artubus pedibusque pilosis, auriculis magnis, conspicuis.* Long. corporis 1" 4"', caudæ 11." From the Nilgiris. We have a Darjiling female which approximates this description, and may prove to be of the same species. Head and body 1½ in.; tail 1 in.; hind-foot and claws ¾ in. Skull somewhat exceeding ½ in. Teeth white. Colour uniform brown, with a slight tinge of chesnut; and scarcely paler below. Feet and tail distinctly furred, besides the usual scattered long hairs on the latter. Claws whitish and conspicuous. Tail brown above, pale and perhaps flesh-coloured beneath; more probably, however, of a livid hue; and tapering evenly throughout. If new, *S. Hodgsonii*, Blyth.

(2818) *SOREX NUDIPEDES*, Blyth. *n. s.* Remarkable for its naked feet and very large ears; also for the odoriferous glands on the sides being strongly developed, whereas we can detect them in no other of these minute species. Length of female, 1½ in.; tail, 1⅛ in.; hind-foot ¾ in. Ears conspicuously larger than in the others: tail almost nude, save of the scattered long hairs: and the fore-feet and toes of the hind-feet are conspicuously naked, and apparently flesh-coloured. Fur uniform brown above (like the back of *CORSIRA VULGARIS*), a little grizzled and glistening; the lower-parts with a silvery gloss: tail brown above, pale (probably flesh-coloured) below; somewhat thick and uniformly tapering. Specimen procured at Amherst (Tenasserim provinces).

(2819) *SOREX ATRATUS*, Blyth, *n. s.* Of this we have only a headless specimen which was found impaled upon a thorn by some Shrike. [Note The same fact we have observed in England of *LANIUS COLLURIS* and *CORSIRA VULGARIS*: these diminutive Shrews falling an easy prey to the "Butcher-birds;" while the larger members of the same genus are ferociously predatory upon any hapless birdlet they may chance to seize,—as is likewise the case with Moles and doubtless other soricidæ of adequate size and strength.] at Cherra Punji in the Khasya hills: but the species is obviously distinct from all the preceding. It is remarkable for its very-dark colour, extending over the feet and tail which is even *blackish underneath*. Length of tail 1 in.; and of hind-foot ¾ in. Fur blackish-brown above, a little tinged rufescent, and with dark greyish underneath; the feet and tail conspicuously furred, besides the scattered long hairs upon the latter.

Here may be noted, that the Society formerly possessed a specimen of one of these minute Shrews, which was found in a cellar in Madras, and was presented by Walter Elliot, Esq.;

## SOREX ATRATUS.

cal with *S. MICRONYX*; so that it could scarcely be so with *S. MELANODON* of Bengal: it was, however, darker than *S. MICRONYX*; and more probably *S. PEROTTETII* (*verus*), if not distinct from the whole of the foregoing. It is even probable that several more Indian species of these most diminutive of all mammalia remain to be discriminated. Upon minute comparison of five specimens in our museum, taken out of spirit and carefully dried for the occasion, we immediately detected four well marked species, and presently afterwards obtained the *S. MELANODON* fresh. It may further be remarked that we once found the nearly digested remains of an adult small white toothed *SOREX*, rather larger than a common Mouse, in the stomach of an *ELANUS* which was shot on the banks of the Hugli, about 15 miles above Calcutta: but we have since in vain sought to procure the species.

Another form of white toothed Shrew, with thick and tapering tail having scattered long hairs upon it, is exemplified by

(2820) *Feroculus*, Kelaart. Teeth small; the upper quasi-incisors shorter and less strongly hooked than in restricted *Sorex* with the posterior spur large; the lower quasi-incisors serrated, shewing two depressions and therefore a row of three coronal points four small upper præmolars preceding the *carnassiez*, the two medial being of equal size, the first rather large, and the fourth small. Feet remarkably large. The ear-conch scarcely visible above the fur.

(2821) *Feroculus Macropus*. *Sorex feroculus*, Kelaart; *S. MACROPUS*, Blyth, *J. A. S.* XX, 163. Length about 6½ in.; of which the tail is 2½ in.; hind-foot with claws nearly ¾ in.; the fore-foot ¼ in. broad, with long and but slightly curved claws, that of the middle digit ¼ in. in length. Fur somewhat long and very soft, uniform blackish, very faintly tinged rufescent; the extreme tip of the tail naked and of a flesh-colour. Inhabits Ceylon.

Another white toothed Indian Shrew exists in the *CROSSOPUS HIMALAYICUS*, Gray, to be noticed presently. We feel much doubt of its being correctly referred to *CROSSOPUS*. [Note. *MYOSOREX*, Gray, is founded on a Cape species, the *SOREX VARIUS*, Smuts, with ear-conch concealed amid the fur, and a slender tail (without scattered long hairs?) the teeth white, and the dentition slightly modified upon that of restricted *SOREX*: lower quasi-incisors "with an entire sharp upper edge."] The greater number of small Shrews inhabiting the temperate regions of Europe, Asia, and N. America, have the teeth always tipped with ferruginous or pitch-colour, a slender Mouse-like tail with no scattered long hairs upon it, and (save in *OTISOREX*) the ear-conch concealed amid the fur. There are two distinct types of dentition.

In one, the upper quasi-incisors are much longer than their posterior spur (as in restricted

SOREX); and the lower have but a single posterior spur more or less rudimental: the lateral small teeth which follow in the upper jaw are four in number (as in restricted SOREX); the first two being equal, the third somewhat smaller, and the last (as usual in all Shrews) minute. With this type of dentition we distinguish

(2822) SORICULUS, Blyth. With the hind-feet of ordinary form and proportions, unadapted for aquatic habits, and the tail tapering and a little compressed at its extremity.

(2823) SORICULUS NIGRESCENS; *Corsira Nigrescens*, Gray, *Ann Mag. N. H.* X, 261, (1842); *Sorex Sikimensis*, Hodgson, Horsfield's Catalogue, (1851). Length of head and body,  $3\frac{1}{2}$  in.; of tail,  $1\frac{1}{2}$  in.; hind-feet and claws  $\frac{5}{8}$  in. Number of caudal vertebræ 15 (besides the extreme tip). Colour throughout blackish, a little tinged with rufous; the feet and claws pale. Very common in Sikkim; and was formerly sent by Mr. Hodgson to the Society's Museum and also to the British Museum from Nepal.

(2824) *Crossopus*, Wagler (*V. Hydrosorex*, N. Duvernoy, and *Pinalia*, Gray). With the hind-feet large and ciliated, and the tail also compressed and ciliated beneath towards its extremity; in adaptation to aquatic habits. *N. B.* S. FODIENS, (*v. Hydrophilus*), Pallas, and other Water Shrews of Europe and N. America constitute the types of this division; and Dr. Gray refers to it a Himalayan species, which, having *white teeth*, we very much suspect will prove to differ in other and more important particulars; even though it may exhibit the *adaptive* characters of an enlarged and ciliated hind-foot and compressed and ciliated tail-tip. It is thus described.

(2825) *Crossopus Himalayicus*, Gray, *Ann. Mag. N. H.* X, 261 (1842). "Length of head and body  $5\frac{1}{2}$  in.; tail 3 in.; hind-foot  $\frac{3}{4}$  in. (nearly). Slate-coloured black, with scattered long hairs, which are longer and white-tipped on the sides and rump: lower part of the throat and the middle of the belly rusty-rusty-brown: tail elongate scaly, with appressed dark brown hairs above and elongated rigid whitish hairs beneath, and brown elongated rigid hairs near the tip: feet rather naked: whiskers numerous, elongate brown. *Teeth white*" probably from the neighbourhood of Simla or Masuri.

In the other type of dentition the lower quasi-incisors are distinctly serrated, with three or four coronal points; and the anterior point of the upper quasi-incisors is not prolonged beyond a level with its posterior spur: the lateral small teeth which follow in the upper jaw are five in number, and diminish gradually in size from the first backward. Tail cylindrical, not tapering and furnished with a stiffish brush at its extremity. Such is the common British land Shrew, *S. VULGARIS*, L. (formerly confounded by British writers with *S. ARANEUS*,

Schreber), and which is the type of *CORSIRA*, Gray (*V. Amphisorex*, No. 1, Duvernoy, apud Gray). There are many other species [Note. *BLARIA*, Gray, (*v. Blarina*, Lesson) is founded on *S. TALPOIDES*, Gapper, Zool. Journ. V, 23,] referred by Blainville to *S. brevicaudus*, Say; a N. American species, which, we believe, only differs from *CORSIRA* in the large size of its fore-feet, and in its very short tail: - and *OTISOREX*, Dekay, is founded on two minute N. American species, which do not appear to differ from *CORSIRA* except in having the ear-conch large and conspicuously visible above the fur. We refer to it doubtfully.

(2826) *Crossopus* (?) *Caudata*; *Sorex caudatus*, Hodgson, Horsfield's Catalogue (1851): for the description seems to indicate a species closely affined to the European *S. ALPINUS*, Schinz; a skull-less example of which from Mt. St. Gothard, is in our museum; and *S. ALPINUS* is ranged among the species having the *Corsira* type of dentition by Prof. Schinz in his *Synopsis Mammalium*: its tail however is naked and compressed at tip. "Length of the head and body  $2\frac{1}{2}$  in.; of the tail the same, slender, nearly naked, and very slightly attenuated. Colour saturate blackish-brown, very slightly rufescent in certain aspects. Snout moderately elongated, furnished at the sides with long delicate hairs."

We now conclude an effort at a *Conspectus* of the Indian Soricinæ, by soliciting aid from all (probably not many persons in India) who take any interest in the subject. It will suffice if specimens could be sent in spirit to the museum of the Society (if disembowelled, and the abdominal cavity cleaned of blood, so much the better for our present purpose, except with regard to the very diminutive species, examples of which are particularly acceptable); such being far preferable to badly prepared skins for being afterwards set up as stuffed specimens, besides permitting of much more satisfactory examination of their differential characters; and it is further desirable that three or four adults of each kind should be thus transmitted to supply our collection with skeleton and stuffed specimens, in addition to at least one to be retained entire in spirit. The *micro-mammalia*, as they have been designated (as Bats, Shrews, Mice, &c.) require to be thus amply represented in museums, for their specific distinctions to be rightly understood in many cases; and the chaos of Indian *MURIDÆ*, in particular, will never be reduced to systematic order, with the synonymes correctly adjusted, until such a tolerably complete collection of them from all quarters has been brought together.—*Journ. As. Soc. of Beng.* No. 1 of 1855.

(2827) *SOUTHWELLIA*\* *BALANGHAS*. China Chestnut: Seeds when roasted, highly palatable.



## SPIDER.

(2828) SOUNG-YA, BURMESE. This plant grows six or eight feet high. Fruit, the size of an apple, elongated, deeply fluted, brilliant yellow, contains ten seeds in five apartments. Chiefly used to acidify curry.—*Malcom. V. 1 p. 183.*

(2829) SPIDER: EPEIRA, species.

Capt. W. S. Sherwill communicated to Mr. Blyth, the following on the bird-devouring habit of a species of spider. This interesting communication on the contested subject of bird-eating spiders originated in his request that the author would commit to paper the observations of which he had assured him in conversation.—*E. B. Beng. As. Soc. Jour. No. VI. of 1850 p. 474.*

During one of my rambles in company with four other officers in the army, amongst the Karrakpur hills, in the immediate neighbourhood of Monghyr, on the Ganges, I fell in with several gigantic webs of a large black and red spider, which stretching across our path in many spots, offered from their great strength a sensible resistance when forcing our way through them. The webs are of a bright yellow colour, and we found them stretching from ten to twenty feet, that is including the great ropes which are generally fastened to some neighbouring tree or a clump of bambus, the reticulated portion being about five feet in diameter, in the centre of which the spider sits waiting for its prey, he is of a dark black hue with red about him, but at this distance of time, now three years, I cannot remember his exact appearance. I brought one down with me from the summit of the mountain Maruk, which is eleven hundred feet above the Ganges, and he measured six inches across the legs when set up. It was in the web of this very spider that I found the bird entangled, and the young spiders (about eight in number and entirely of a brick-red colour) feeding upon the carcass. The bird was much decomposed and enveloped in web, but the beak and feet being visible I sketched them, a copy of which sketch I enclose for your satisfaction. The bird is a *Nectarinia* apparently, and probably *N. asiatica*: it hung with his head downwards, his wings were closely pinioned to his sides by the entwined web, and was nearly in the centre of the web. The old spider which I secured was above the bird about a foot removed.

Had we not been a half-starved party, we should have bottled the bird, spider and young ones, but we were at the end of a five-days' roam amongst these steep hills, covered with wet grass, without beds or covering, in the height of the rainy season, so you may imagine our commissariat was at too low an ebb to afford brandy for such a purpose. This communication from Capt. Sherwill is the more interesting, since the total demolition of Madam Merian's account of a bird-eating spider in Surinam, by Mr. W. S. McLeay, in the 'Proceedings of Zoological Society,' 1834, p. The species would

## STILLINGIA SEBIFERA.

appear to be an *Epeira*, most probably undescribed, and remarkable for the "bright yellow colour" of its web.—*Beng. As. Soc. Jour. No. VI. of 1850.*

(2830) SPRENGER, A Medical Officer of the Bengal Army. A philologist, who has contributed much to illustrate Persian and Arabic literature.

(2831) SSIPAN DAGH. The mountain called the Ssipan Dagh rises to the height of 10,000 feet, and lies between lake Van and the Murad Tchai or Eastern Euphrates. The river there is crossed on a raft, supported on inflated skins. The mountain appears to rise abruptly from the plain and is covered with perpetual snow. On one occasion travellers were detained nearly four hours on the banks of the river, owing to the difficulty in getting their horses to swim across, and many persons were waiting with exemplary patience to be carried over on the raft, all which would be avoided if the paternal Government of the Sultan would repair the two broken arches of the bridge.

(2832) STAUNTONIA LATIFOLIA.

Ramkela

Gophla.

Fruit edible.

(2833) STERCULIA, A genus of the Bytneriaceæ family; one species in Africa, and another in India, *S. foetida* yields a tragacanth like gum. *S. guttata*, grows in Malabar, the bark of the younger parts of the tree gives very strong white faxen fibres, from which the Wynaad inhabitants fabricate a coarse cloth. The tree is felled when ten years old, cut into pieces, the bark stripped off and chopped, washed and dried in the sun and without further process it is fit for clothing. *S. villosa*, the "Oadal" of Assam, is a native of the mountainous countries east of Bengal. Bags are made of its bark, and its fibres are made into cords to bind wild Elephants with. The rope is very strong and lasting, and little injured with wet. Rope made from the inner layers of bark are finely pliable, and the outer fibres yield a coarse rope.—*Eng. Cyc.*

(2834) STERCULIA FÆTIDA.

Junglee Badam.

• Natives roast and eat the seeds.

(2835) STERCULIA VILLOSA.

Oodial.

Kurdula.

A strong rope is manufactured from the bark fibres.

(2836) STEREOSPERMUM, Pathree Marum. One species, a large tree, the wood of which used for building and making cases, is common in Wynaad.—*McIvor. M. E.*

(2837) STILLINGIA SEBIFERA grows luxuriantly in the Deyhra Doon and lower Himalayas, and in the Kohistan of the Punjab. There is an interesting paper on the *Stillingia Sebifera* by Dr. Macgowan in the 7th volume p. 164 of the Journal Horticultural Society of India. It flowers in June and during the rains

## STORMS OF DUST IN INDIA.

and its seeds are collected in December. It grows luxuriantly in the Dehra Dhoon and lower Himalayas and in the Kohistan of the Punjab. In addition to the tallow obtained from its seeds and used in making candles a black dye is obtained from its leaves.

(2838) STORMS OF DUST IN INDIA. One observer of Dust storms, has attended to them as far back as the hot weather of 1847, when he first went to Lahore, and the result is as follows:—Dust storms are caused by spiral columns of the electric fluid passing from the atmosphere to the earth; they have an onward motion—a revolving motion, like revolving storms at sea—and a peculiar spiral motion from above downwards, like a corkscrew. It seems probable that in an extensive dust-storm there are many of these columns moving on together in the same direction, and during the continuance of the storm, many sudden gusts take place at intervals, during which time the electric tension is at its maximum. These storms hereabouts mostly commence from the north-west or west and in the course of an hour, more or less, they have nearly completed the circle, and have passed onwards.

Precisely the same phenomena, in kind, are observable in all cases of dust-storms: from the one of a few inches in diameter to those that extend for fifty miles and upwards, the phenomena are identical.

It is a curious fact that some of the smaller dust-storms occasionally seen in extensive and arid plains, both in the country and in Affghanistan above the Bolan Pass, called in familiar language "Devils," are either stationary for a long time, that is upwards of an hour, or nearly so; and during the whole of this time the dust and minute bodies on the ground are kept whirling above into the air, in other cases these small dust-storms are seen slowly advancing, and when numerous, usually proceed in the same direction. Birds, kites and vultures, are often seen soaring high up just above these spots, apparently following the direction of the column, as if enjoying it. [Note. They may be looking for prey, or involved in and unable to fly out of, the invisible part of the electrified aerial column, of which the lower part only is visible to us by the dust raised.—*Ed. Journal.*] My idea is that the phenomena connected with dust-storms are identical with those present in waterspouts and white squalls at sea, and revolving storms and tornadoes of all kinds; and that they originate from the same cause, viz. moving columns of electricity.

In 1847, at Lahore, being desirous of ascertaining the nature of dust-storms, I projected into the air an insulated copper wire on a bamboo on the top of my house, and brought the wire into my room, and connected it with a gold leaf electrometer and a detached wire communicating with the earth. A day or two after, during the

## STRIX.

of observing the electric fluid passing in vivid sparks from one wire to another, and of course strongly affecting the electrometer. The thing was now explained; and since then I have by the same means observed at least sixty dust-storms of various sizes, all presenting the same phenomena in kind.

I have commonly observed that, towards the close of a storm of this kind, a fall of rain suddenly takes place, and instantly the stream of electricity ceases, or is much diminished, and when it continues, it seems only on occasions, when the storm is severe and continues for some time after. The barometer steadily rises throughout. In this part of the world, the fluctuation of the barometric column is very slight, seldom more than two or three tenths of an inch at a time.

The average height at Lahore is 1180, corrected for temperature, indicating, I suppose, above 1150 feet above the level of the sea, taking 30 inches as the standard.

A large dust-storm is usually preceded by certain peculiarities in the dew-point, and the manner in which the particles of dew are deposited on the bulb of a thermometer. My mode of taking the dew-point is to plunge a common thermometer in a little ice, let it run down 20° or 30°.

The manner in which the electricity acts upon the dust and light bodies it meets with in its passage, is simple enough. I suppose the particles similarly electrified and mutually repulsive, and then, together with the whirling motion communicated to them, are whisked into the air.

The same takes place when the electricity moves over water. The surface of the water becomes exposed to the electric agency, and its particles, rendered mutually repulsive, are in the same way whirled into the air.

At sea the waterspout is thus formed. First of all is seen the cloud descending and beneath may be observed the water in a cone.—*Beng. As. Soc. Jour. No. V. of 1850 p. 790.*

(2839) STRIX. The Owl. Many races, alike of Europe and of Asia, continue to entertain superstitious opinions regarding species of this nocturnal genus. The women of India, hearing the hooting of the Ghugu, shut to them ominous sounds out from their ears by wrapping their Sarhis round their heads. Of the *Barn owl*, *Strix flammea*, a poet says:

The white owl seeks the antique ruined wall,  
Fearless of rapine; or in hollow trees,  
Which age has cavered, safely courts repose.

And Shakespeare notices the common superstition, when he says:—

It was the owl that shrieked, the fatal bellman,  
Which gives the stern'st good night."

*The Snowy owl, Strix nuctea*, has also been



When day declining sheds a milder gleam,  
 What time the May fly haunts the pool or stream;  
 When the still owl skims round the grassy mead  
 What time the timorous hare limps forth to feed;  
 Then be the time to steal adown the dale,  
 And listen to the vagrant cuckoo's tale;  
 To hear the clamorous curlew call his mate,  
 Or the soft quail his tender pain relate;  
 To see the swallow sweep the darkening plain  
 Belated, to support her infant train;  
 To mark the swift in rapid giddy ring,  
 Dash round the steeple unsubdued of wing:  
 Amusive birds! say where your hid retreat,  
 When the frost rages and the tempests beat;  
 Whence your return, by such nice instinct led,  
 When spring soft season lifts her blooming head?  
 Such baffled searches mock man's prying pride,  
 The God of Nature is your secret guide!  
 While deepening shades obscure the face of day,  
 To yonder bench leaf-sheltered let us stray,  
 Till blended objects fail the swimming sight,  
 And all the fading landscape sinks in night;  
 To hear the drowsy dore come brushing by  
 With buzzing wing, or the shrill cricket cry;  
 To see the feeding bat glance through the wood;  
 To catch the distant falling of the flood;  
 While o'er the cliff th' awakened churn owl hung,  
 Through the still gloom protracts his chattering  
 song;  
 While high in air, and poised upon his wings  
 Unseen, the soft enamoured wood lark sings;  
 These, Nature's works, the curious mind employ,  
 Inspire a soothing melancholy joy;  
 As fancy warms, a pleasing kind of pain  
 Steals o'er the cheek, and trills the creeping vein:  
 Each rural sight, each sound, each smell, com-  
 bine;  
 The tinkling sheep-bell, or the breath of kine:  
 The new mown hay that scents the swelling  
 breeze,  
 Or cottage chimney smoking through the trees,  
 The chilling night dews fall;—away, retire?"

White.

(2840) SULU. [From a paper by Mr. Bartlett, Cor. Secretary of the American Ethnological Society, in the Transactions of the Society.]

Mr. Itier, attache to the French mission in China, has recently visited a cluster of islands lying to the northeast of Borneo, between that island and Mindano. His researches on the natural history and geology of these islands, are of much interest. The soil is exceedingly fertile, and the climate more healthy than is usual in intertropical climates. The sugarcane, cocoa, rice, cotton, the bread fruit, indigo, and spices of all kinds, are among their products. Fruits and vegetables are of a great variety, abundant, and of a superior quality. Nine-tenths of the soil is still covered with the primitive forest, of which teak-wood, so valuable in ship building, forms a part. A considerable commerce with China and Manila is carried on, and from ten to

twelve thousand Chinese annually visit the island of Basilan, the most northerly of the group, to cultivate its soil, and take away its products. The peculiar situation of these islands, and their contiguity to the Philippines, to Celebes, Borneo, Manila, China, and Singapore, make them well adapted for a European colony. In fact, there do not appear to be any islands of the East Indies of equal importance, and there can be no doubt that with the present desire manifested by European nations for colonizing, this desirable spot will ere long be secured by one of them. The Sulu group embraces sixty inhabited islands, governed by a Sultan, residing at Soug. One of these would be an advantageous point for an American colony or station.—*Jour. of the Indi. Arch. Vol. No. 7 July, 1849, page 412.*

(2841) SUNJIE UJONG :—a state, in the interior of Malacca.—*Benl. As. Soc. Jour. No. IV. of 1856. p 366.*

(2842) SUNG YANG HILLS, of China bordering on Fohkien.

"*Alum.*—About eleven hundred tons of Alum have been exported from Ningpo within a short period, chiefly to India. This mineral is largely employed by the Chinese in dyeing, and to some extent in paper-making as with us. Surgeons apply it variously after depriving it of its water of crystallization, and in domestic life it is used for precipitating vegetable substances suspended in potable water. It is used also by the Chinese in a manner peculiar to themselves. Fishermen are usually provided with it, and when they take one of those huge *Rhizostoma* which abound on the coast they rub the animal with the pulverized styptic to give a degree of coherence to the gelatinous mass. Architects employ it as a cement in those airy bridges which span the water-courses. It is poured in a molten state into the interstices of stone, and in structures not exposed to constant moisture the cohesion is perfect, but in damp situations it becomes a hydrate and crumbles, a fact of which the whole empire was officially informed by the government about thirty years ago. It was discovered that water had percolated into the mausoleum of Kiaking, having been built too near to the mountain side, the alum cement imbibed moisture, segregated and opened the way for to enter the tomb. In those peaceful days such an event was of such importance as to call forth edicts and rescripts, memorials and reports in succession for several months. The son-in-law of the deceased monarch to whose care the construction of the edifice had been entrusted was fined and degraded, and a statesman from Fohkien acquainted with the properties of alum was appointed to remove it a short distance from the mountain.

"Alum was first introduced into China from the West, and until a comparatively recent period the best kind called sometimes Persian, and at others Roman Alum was brought from Western

## SUNG YANG HILLS.

**Asia.** Numerous localities where an inferior article is manufactured are mentioned in the *Pharmacopœia*—viz., Shan-tung, Shan-se, Kiaug-su, Hukwang, Sz'-chuen, also in the South-western frontier and in Tibet. That from Sz'-chuen is represented as having the property of converting iron into copper or of coating iron with copper, by placing the former metal in a solution of rice liquor and alum, the stone of that province. The most recent editions of works on materia medica contain no reference to the mines in this province, the products of which have surpassed in quality the foreign, and rendered its importation unnecessary. From this and from other circumstances it is certain that the works which we shall now describe have not been long in operation. They are in the Sung-yang hills bordering on Fohkien in the district of Ping-yang, Wan-chan prefecture, and in close proximity to Pehkwan harbour ( $27^{\circ} 9' 10''$  N.,  $120^{\circ} 32' 6''$  E.)

The locality has been visited by one foreigner only, to whom we are indebted for most of the following particulars. About two months ago, he started from Chih-k'-i bight in Lannai harbour to which Ningpo boats resort for this commodity to the Northward of Peh-kwan. Three hours' hard walking over a succession of precipitous hills crossed by stone steps and pathways brought him to the mines. Ten Alum-making establishments were in operation, which, with the exception of one on a hill opposite, occupied about a mile of the side of a lofty hill. The works were adjacent to the quarries from which the Alum-stone seemed to crop out of decomposed rock of the same lithological character. The stones were thrown into a fire of brushwood where they burnt with a slight lambent flame and as they cracked, the fragments were raked out broken into small pieces, and macerated in vats. Subsequently the disintegrated mineral was thrown with water into a vessel having an iron bottom and sides of wood and boiled for a short time. The lixivium was then poured into large reservoirs where it crystallized into a solid mass. Blocks of alum weighing about fifty catties each were hewn out of the reservoir and carried in this state in bamboo frames, one on each end of a porter's pole to the place of shipment, where it is broken into fragments. When not designed for immediate exportation, the blocks are stored away for drying. On reaching the depot the alum is found charged with a double quantity of moisture, the porters being obliged to deliver a certain weight, they dip their burdens in the mountain streams which they pass in the journey. Judging from the number of labourers engaged in transporting the mineral on the day of our informant's visit, the quantity brought from the works could not be less than eighteen tons. This was represented as less than an average day's work, and labour was in such demand just then

## SUMATRA.

for agricultural purposes that double pay was given and aged men, and women, with boys and girls were pressed into the service. Assuming that day's product as a basis for calculation and making an allowance for rainy days, we may safely estimate the annual supply as between five and six thousand tons. The quantity consumed by the dyers of Ningpo prefecture alone, being nearly twenty-two tons per annum, is corroborative of this estimate. The supply is literally inexhaustible. Five dollars-and-quarter a ton at the landing would afford the manufacturer a fair profit. It often fetches much more, as there has been an increasing demand for the article owing to the greater facilities afforded for exportation from Ningpo in foreign vessels.

The Wan-chau Alum is equal to the best Roman,—a roseate tint in some specimens indicates the presence of minute quantities of iron.

We have no means of ascertaining the precise geological position of the rock from which this alum is procured; some circumstances seem to indicate it to be a new mineral. It is stated that no potash nor any other material is employed in the works. Granitic and porphyritic rocks abound in the vicinity, and some parts of the district produce iron and silver. According to the Wan-chau Topography, the working of silver was discontinued in the reign of Wan-lih (1615) in consequence of imperial prohibition. This part of the coast has recently become the seat of extensive poppy cultivation for the bane of the Chinese race.

As a contribution to the physical description of the alum district, we would add that the typhoon of September 1855, was preceded by a rising of water in wells and ponds many miles inland. When the cyclone reached the coast it submerged about a hundred square miles, occasioning a vast destruction of life and property. The waters of the sea were retained in the country by strong Easterly winds for several days leaving a strip of land bordering on the sea quite dry."—*North China Herald*, 23rd January 1856."

The rock, for it is one, and not a mineral, is a gray felspar porphyry with minute brilliant white specks, which may be arsenical pyrites, silvery mica or sulphuret of nickel, but I was unable to sacrifice enough of the rock to ascertain what it was. When polished it shews a very pretty surface, and a small portion pulverised and calcined and then boiled gave sulphuric acid and alumina to the usual tests, so that it is probably an alum porphyry, i. e. a porphyry containing Alunité.

(2843) SULPHATES OF SODA. KHARIN-NOON, effloresce on the soil of Tirhoot and Sarun in the province of Behar.

(2844) SUMATRA. *Position and Extent.* Leaving out of view its modern alluvial accessions,



## SUMATRA.

Sumatra consists of a rectilinear belt of elevation, stretching from the parallel of Pinang to that of Bantam, and shutting in the Malay Peninsula and China Sea from the Indian Ocean. Its extreme northwest and southwest points differ  $10^{\circ}30'$  in longitude and  $11^{\circ}40'$  in latitude, the former being in  $5^{\circ}45'$  N. B.,  $95^{\circ}10'$  E. Long. and the latter in  $5^{\circ}55'$  S. L.,  $105^{\circ}40'$  E. Long. The belt thus makes an angle of about  $36^{\circ}$  with the meridian, its direction being a little west of N. W. by N., which gives it a length of about 925 geographical miles. Its average breadth appears to be rather more than 90 miles, as it nowhere expands to a much greater breadth for a considerable space save in the middle region, nor contracts to a less save at the northern and southern extremities. The area covered by it is about 85,000 square miles. The true limits and configuration of this mountain region on the east have not been ascertained, but it probably forms a vast number of systems of low hills as on the west coast, and as in the Malay Peninsula on the margins and in the depressions of the belt of mountain groups. The body of the Sumatran zone does not appear to consist of elevated chains of great length, but of numerous short ranges and isolated mountains varying extremely in all their dimensions. The circumstance of the belt being partly plutonic and partly volcanic forms its peculiar character. Its configuration is in fact a combination of that of the Malay Peninsula with that of Java, with this difference that its middle region is more elevated and expanded than any part of the peninsula, several of its masses being about thrice the height of the highest summits of that range. If a number of volcanic mountains rose here and there amongst the peninsular groups, and in greatest number in Pera, Tianggau and Patani, where it is broadest, it would be identified in character with Sumatra. The greater elevation of the mountains of the latter is however accompanied by a greater expansion of the plains and vallies which lie amongst them. In crossing it anywhere, save towards its northern and southern extremities, three, and sometimes more, principal ranges are found with wide table lands, plains or vallies between them, watered by numerous streams, and in some places containing lakes, as in the principal Korinchi plain, the great Malayan plain of Menanghabau and the Bata plain of Tobah. The most western ranges form the water shed, and as the land to the west of it, chiefly hills, is not more than 25 miles broad, about one fifth only of the waters of the island fall into the Indian ocean, the Straits of Malacca and the Java sea receiving the remainder, in nearly equal proportions as regards the drainage of the mountains, but with a large excess to the latter from the wide plain traversed by the rivers that disembogue into it.

The western margin of the belt, washed by

## SUMATRA.

the strong waves of the Indian Ocean, has retrograded to the eastward, the sediment of the rivers and the debris of the coast being carried away instead of being deposited. The northern part of the east coast, exposed to the assault of the Bay of Bengal, has retained its ancient dimensions, if it has not contracted, but as soon as the open sea is exchanged for the Straits of Malacca, the mountain belt begins to retire from the coast, and a great alluvial plain commences, which, to the south of the S. E. extremity of the Batta country opposite Parcelar hill, where the Peninsular and Sumatran belts approach nearest each other, expands to a breadth varying from 60 to 110 miles. The length is about 600 miles and the average breadth about 70 miles which gives a surface of about 42,000 square miles. [Note. This plain and the mode of its formation, was described in a Sketch of the Physical Geography and Geology of the Malay Peninsula, Journ. Ind. Arch. Vol. II. p. 129-132.] If to this we add 1,500 square miles for the area of the flat alluvial land to the north of [the great plain, we shall have 128,500 miles as the area of the whole island, [Note. This result is nearly identical with the gross estimate of Lieut. Melville vanCarnbee, which is 8,035 leagues = 128,560 Eng. sq. geo. miles. ib. p. 176.] the mountain region occupying about two thirds. The islands on the west coast give a further surface of 5,000 miles to be added to the elevated region, and this will make it almost exactly double the size of the alluvium.

### *Range and numbers of the different Races of Inhabitants.*

#### I. Wild Tribes.

There are two races which, not being confined to particular localities, it is necessary to mention first. They are at the opposite extremes of the civilization of the island. The one is a half wild people, the scattered remnants of the aboriginal inhabitants, now broken by oppression and solitary confinement for centuries in the jungly mountains, into a number of disconnected patches of communities, differing, it is probable, considerably in language and little in condition and ideas. Most of the notices of them are so meagre that they do nothing more than prove the fact of their existence in widely separated parts of Sumatra. Thus in the north, where they are known under the name of Orang Lubu the Battas describe them as having inhabited Pertibi before they occupied it. [Note Willer, Tigd. v. N. Ind. 8th y. 2d part p. 402.] They are found up the Mandan above Siak [J. Anderson, Mission to Sumatra p. 349.] In the south again they are mentioned under the name of Orang Kubu by Marsden and other writers who resided on the west coast, and we know from information received from Malays that they are found in the interior on ascending most of the large rivers whose embouchures are on the east coast. Major Sturler in his account of Palembang

bang gives a particular description of the Orang Kubu, who in condition and habits entirely agree with the wilder tribes of the Malay Peninsula. The same remark applies to the Orang Gunong of Banka. The southern extremity of the mountain belt is inhabited by the Orang Abung, a head hunting race. These are the mountain nomades, but there are also half wild people, some living in boats in the salt water creeks, and others in the sago forests and low jungles of the east coast. In this lowest class of Sumatran tribes should be included those inhabiting some of the western islands, such as the Enganoans.

Their physical resemblance to the Malays is everywhere remarked, and, as formerly stated, in the Journ Ind. Arch. Vol. II. p p 332, 517, there seems no room to doubt that they are the aborigines of the Malayan region of Sumatra, and the remnants of the stock from which the present Malays have descended. Their numbers may be provisionally assumed at 6,000. The Abung and Kubu in the south appear to near about 2,000.

## II. Orang Malayu (Malays.)

We now proceed to the Malay races themselves, the principal inhabitants of the island, whether we consider their range, numbers, actual territory, influence or civilization. They entirely occupy the wildest and middle region of Sumatra extending from the Rakan nearly to the Palembang on the east coast, and from Ayer Bangis to Kataun on the west coast, a length of about 275 m. with an average breadth of about 190 m. and a superficies of 52,250 square miles, or little short of one half of Sumatra. The east coast is nearly straight, running throughout in a direction due N. W. by N. and evincing the wonderful regularity, unity and power of the elevatory movement which formed the mountains. The breadth of the highlands is about 95 miles. The low land that stretches from their base to the east coast has about the same average breadth, so that the region is divided in nearly equal proportions between them. The greater part of the low lands appear to be nothing more than the waste matter of the mountains brought down by the streams, and as the ranges must have been pared down to a still greater proportionate extent on the western side of the watershed, where their sea face is exposed to a tremendous surf, the loss must have been enormous and the date of their elevation extremely remote. It is this accumulation of sediment over so wide a surface on the east side of the mountains that has given rise to the great rivers which intersect the plain, the Siak, Kampar, Indragiri, Iambi and Palembang. It was the possession of this central, largest and most highly favoured region, that enabled the Malays to grow in numbers and civilization till they obtained supremacy in Sumatra. The mountains contain numerous vallies, some

cleared by volcanic soil. The population varies extremely in density. The higher parts of the mountains, and the low land between the rivers, are left to the jungle and wild animals, and possess hardly any human inhabitants. The rivers have considerable collections of houses scattered at greater or less intervals along their banks, and extending a short distance from them. The principal vallies in the mountains, on the other hand, are completely cultivated and filled with inhabitants. While the countries of Siak, Indragiri, Iambi and the northern part of Palembang, including a portion about 25 miles broad of the eastern flanks of the mountain land, contain about 200,000 souls or 5 to the square mile, the single province of Menangkabau has a population of about 385,000 or 128 to the square mile, and the whole mountain land taken together gives a mean of 40 to the square mile.

The population is distributed as follows :

### 1st.—Malays of the Mountain region.

- a. Menangkabau.
- b. Malays of the Region of Sapulo Bua Bandar and Gunong Sungèi Pagu.
- c. The Korinchi.
- d. The Rawa.

### 2d.—The Malays of the hilly territories to the west of the mountain region.

- a. The sea-bord of Menangkabau (1700 sq. m.)
- b. The sea-bord of Sapulo Bua Bandar having a surface of 1,300 sq. m.

### 3rd.—The Malays of the low lands or eastern countries.

### 4th.—The Malays of the East Coast of the northern region.

Their entire number does not appear to be above 60,000, [Note. Anderson gives 350,000 as the population of this part of the east coast, but he includes a considerable portion of the Bata region lying behind the Malayan sea-bord, and it is clear that this number was a mere guess made without reference to the data of which he was in possession, for the numbers which he set down at the different places which he visited do not give an aggregate of much more than one half of this estimate, distributed as follows :

#### • Southern Races.

- III. Orang Palembang.
- IV. Orang Rejang.
- V. Orang Serawi.



## SUMATRA.

### The Northern Races.

#### VII. Orang Batta.

1st. Battas on the West Coast formerly subject to Malay rulers.

2nd. Battas on the low land and hilly region on the east side of the mountains.

3rd. Battas of the mountain region.

#### VIII. Orang Ache.

Western Islands.

IX. Orang Engano.

X. Orang Mantawei.

XI. Orang Niha or Nias.

XII. Orang Maruwi.

It will be borne in mind that the above estimates are for the most part rough approximations. The precise boundaries between the different races have nowhere been well ascertained and are doubtless in no case so regular as we have assumed for the purpose of calculation, but we believe the relative extent of country occupied by each will be found not to vary much from what we have allowed. It should also be remarked that not only do these races blend with each other at their boundaries, many districts and villages in the northern region for instance being peopled by Malays and Battas. Malays and Achinese, or Achinese and Battas, but most of the settlements near the coast possess in addition a very mixed population of foreigners from the rest of the Archipelago, China, India and Arabia, while Europeans are found in small numbers in the Netherlands possessions, chiefly at Palembang, Bankaulu and Padang. Our result of little more than two millions for the entire population is about one half of the current estimates. The most careful of these, that of Mr. Francis, is 4,500,000, \* but ours is to a large extent founded on the data supplied by him and his error consists in his having exaggerated the population of the countries for which he had no data. In the great majority of cases the effect of more careful enquiry has hitherto been to reduce general estimates for particular localities, and we may therefore believe that the gross population is under rather than above two million.

* Malays.....	2,000,000
Rejangs and Pasumahs...	600,000
Lampongs.....	150,000
Battas.....	1,200,000
Achinese.....	600,000

## SUMMARY OF NAIR LIFE.

The following Table exhibits the results of our enquiry.

	Area.	Population.	Rate per square Mile.	Per centage of whole population.
I. Wild Tribes.....	.....	6,000	.....	...
II. Orang Malayu.....	.....	.....	.....	...
Mountains.				
Menangkabau.....	3,000	385,000	128	...
Its Seaboard.....	1,700	64,350	38	...
Sapulo Bua Bandar.....	3,250	40,000	15	...
Its Seaboard.....	1,300	31,200	24	...
Korinchi.....	5,000	75,000	15	...
Rawa.....	1,600	25,000	16	...
Northern Seabords.....	.....	.....	.....	...
East Coast.....	3,000	60,000	20	...
West Coast.....	3,400	24,100	80	...
Eastern lowlands & hills	36,000	184,000	5	...
Malays elsewhere.....	.....	10,000	.....	...
Total.....	59,050	898,656	15	42
III. Orang Palembang....	13,400	201,000	15	9
IV. Orang Rejang.....	4,500	72,000	16	3
V. Orang Serawi.....	4,875	160,000	32	7
VI. Orang Lampong.....	8,280	92,900	11	4
VII. Orang Batta.....	.....	.....	.....	...
West Coast.....	.....	4,300	.....	...
Eastern lowlands & hills.	3,200	63,280	20	...
Mountain Region.....	.....	.....	.....	...
Northern division.....	1,800	36,000	20	...
Middle division.....	4,176	125,280	30	...
Southern division.....	6,624	83,000	12	...
Total...	15,800	311,860	20	14
VIII. Orang Ache.....	22,600	450,000	20	21
Grand Total...	128,505	2,186,410	17	...
Western Islands.				
IX. Orang Engano ... ..	400	000	24	...
X. Orang Mantawei... ..	2,240	5,000	24	...
XI. Orang Niha.....	1,800	286,000	160	...
XII. Orang Maruwi.....	600	3,000	5	...
Total ..	5,040	294,900	58	...

—*Jour. of the Indian Archipelago, Vol. III. No. 1. June 1849. pp. 345 to 361.*

### (2845) SUMMARY OF NAIR LIFE.

"The Nairs marry before they are ten years of age, but the husband never afterwards cohabits with his wife. Such a circumstance, indeed would be considered as very indecent. He allows her oil clothing, ornaments, and food; but she lives in her mother's house, after her parent's death, with her brothers, and cohabits with any person that she chooses of an equal or higher rank than her own. If detected in bestowing her favours on any low man, she becomes an outcast. It is no kind of reflection on a woman's character to say, that she has formed the closest intimacy with many persons; on the contrary, the Nair women are proud of rec-

## SWALLOW.

In consequence of this strange manner of propagating the species, no Nair knows his father; and every man looks upon his sister's children as his heirs. He, indeed, looks upon them with the same fondness that fathers in other parts of the world have for their own children; and he would be considered as an unnatural monster, were he to show such signs of grief at the death of a child, which, from long cohabitation and love with his mother, he might suppose to be his own, as he did at the death of a child of his sister. A man's mother manages his family, and after her death his eldest sister assumes the direction. Brothers almost always live under the same roof; but, if one of the family separates from the rest, he is always accompanied by his favourite sister. Even cousins, to the most remote degree of kindred, in the female line, generally live together in great harmony; for in this part of the country, love, jealousy, or distrust, never can disturb the peace of a Nair family. A man's moveable property, after his death, is divided equally among the sons and daughters of all his sisters. His land estate is managed by the eldest male of the family; but each individual has a right to a share of the income. In case of the eldest male being unable, from infirmity or incapacity, to manage the affairs of the family, the next in rank does it in the name of his senior."—*Buchanan Hamilton, quoted in Journ. of the Ind. Arch. Vol. III. No. VI. June 1849, p. 364.*

(2846) SUSUP, the Malay name of a tree having a bright scarlet flower, found on the island of Pulo chiku koh.

(2847) SUTWASA, a rite observed amongst Mahomedans when a woman has attained the seventh month of her pregnancy.—*Herk.*

(2848) SWALLOW. The chimney swallow *Hirundo rustica*, of Europe, has been thus addressed.

Welcome, welcome, feather'd stranger,  
How the sun bids nature smile;  
Safe arrived, and free from danger,  
Welcome to our blooming isle;  
Still twitter on my lonely roof,  
And hail me at the dawn of day,  
Each morn the recollected proof  
Of time that ever fleets away.

"Fond of sunshine, fond of shade,  
Fond of skies serene and clear;  
E'en transient storms thy joy invade,  
In fairest seasons of the years.  
What makes thee seek a milder clime?  
What bids thee shun the wintry gale?  
How know'st thou thy departing time?  
Hail! wondrous bird! hail, swallow, hail!

## SYKES, COLONEL.

Sure something more to thee is given,  
Than myriads of the feather'd race,  
Some gift divine, some spark from heaven,  
That guides thy flight from place to place.  
Still freely come, still freely go,  
And blessings crown thy vigorous wing;  
May thy rude flight meet no rude foe,  
Delightful messenger of spring!"

(2849) SWORD BLADES OF CUTCH. An inch bar of fine English or Swedish steel is forged into plates 7 inches long, 1 broad and  $\frac{1}{8}$  thick: similar bars of fine spot iron are prepared in the same manner. These are smeared with a paste of borax dissolved in water, and laid in piles of twelve, nine of steel to three of iron, or three to one, alternately; each pile is wrapped round with rag thickly plastered with mud made of a loamy earth; then heated, welded, and drawn out to a bar one inch and one eighth broad and one third of an inch thick, this is bent zigzag three or four times; is again welded and drawn out to half an inch thick; and during the heat, borax is frequently dropped on the metal while in the fire. Two of these bars are next welded into one and when about twelve or fourteen inches long it is bent into the form of a loop or staple. In the middle of this a piece of fine grained file is inserted of the same width and nearly as thick. All is then welded together and the blade is formed.

*Tempering.*—An earthen pot twelve inches wide and six deep is notched on the edges (the notches being opposite each other) with a file about a quarter of an inch deep and is then filled nearly up to the notches with water. Oil is then poured on the surface. The blade being heated equally to a light red is removed from the fire and the point entered into a notch on one edge is passed to the opposite one keeping the edge from a quarter to half an inch in the oil. It is drawn backwards and forwards rather slowly till the hissing ceases and the rest of the blade above the fluid has become black. A jug of water without oil is then poured along the blade from heel to point. In order to take out the warp produced by tempering, the blade when nearly cold is passed over the fire three or four times, then being brought to the anvil is set straight by striking it regularly but moderately with a hammer; by this means a damascus curved blade may be brought nearly straight.—*Rohde, M.S.S.*

(2850) SYEDANI, HIND. A Syed woman.

(2851) SYKES, Colonel W. H. An officer of the Bombay Army, a statistician, zoologist and statesman.



## T.

(2852) TABASHEER, CHEMICAL ANALYSES OF, BY THOMAS THOMPSON, M.D., &c.

Tabasheer is a concretion met with occasionally in the joints of the bamboo; it has been long employed in medicine, in Hindoostan and the east; it is very much esteemed; and sells at a considerable price. The first good description of it was drawn up by Dr. Russell, and published in the "*Philosophical Transactions*," for 1790, p. 273. The specimen, laid before the Royal Society, by Dr. Russell, was put into the hands of Mr. Smithson for chemical examination. A very minute, accurate, and complete set of experiments, by this acute and accomplished philosopher, was published in the "*Philosophical Transactions*," for 1791, p. 368, from which it appeared, that the tabasheer was composed of silica nearly in a state of purity.

In the year 1806, a specimen of tabasheer, from Peru, was put into the hands of Fourcroy and Vanquelin, by Humboldt and Bonpland. These chemists subjected it to analysis, extracted from it 70 per cent. of silica, together with a little lime, and concluded though it is not easy to see the evidence, that the tabasheer, which they examined, was a compound of 70 parts of silica, and 30 parts of potash. But under the potash were included the vegetable matter which they showed it to contain, and also, the water, the amount of which, they seem not to have thought of determining.

In 1819, a curious paper on the optical properties of tabasheer, was published in the "*Philosophical Transactions*," by Dr. Brewster. An abstract of this paper, together with several particulars, relative to the history and formation of the tabasheer, was inserted in the 8th Volume of Dr. Brewster's "*Journal of Science*," and in the same volume, we have a chemical examination of the tabasheer, by Dr. Turner. This analysis agrees very nearly with that of Mr. Smithson, and renders the accuracy of the statement of the great quantity of potash, announced by Fourcroy and Vanquelin, rather doubtful.

The tabasheer Dr. Thompson continues, which I examined, was a very beautiful looking substance, in small irregular fragments of a blueish white colour and pearly lustre, not unlike chalcodony in appearance, but much softer. For it was incapable of scratching calcareous spar, and only slightly scratched sulphate of lime. When put into water, it gives out a great deal of air with a kind of crackling noise, and imbibes a great deal of water.

I found its specific gravity, (taken without

allowing time for the internal air to escape), 1.9138. But, when by means of heat all the air bubbles had been driven off, the specific gravity was as high as 2.0824.

When ignited, it lost 4.87 per cent. of its weight. This loss consisted chiefly of water, but not entirely, for the tabasheer exhaled a peculiar odour, and showed evidently, the existence of a small quantity of vegetable matter in it.

Ten grains of tabasheer reduced to a fine powder were digested in distilled water for 24 hours. The water when concentrated was tasteless; but slightly reddened vegetable blues. Being evaporated to dryness, grayish scales remained, weighing 0.6 gr. These scales being digested in muriatic acid, a little iron was dissolved, but the scales consisted almost entirely of silica. Thus it appears that the silica in the tabasheer is still soluble in water. I am disposed to consider, the reddening of vegetable blues in this case, as produced by the dissolved silica; at least, I did not succeed in finding any trace of any other acid substance. When the muriatic acid dissolved upon the scales was evaporated to dryness, a brown matter remained, which besides iron, contained also a trace of vegetable matter, but too small to admit of examination. It contained also a little lime and a little silica.

Ten grains of tabasheer reduced to a fine powder were mixed with 24 grains of finely pounded flour spar, and the whole was made into a thin magma by means of sulphuric acid. This mixture was exposed for some hours to the heat of the sand bath in a platinum crucible. After the exhalations of fluo-silicic acid had ceased, the crucible was exposed to a heat gradually increased to redness, and kept in that temperature till all the excess of sulphuric acid had been driven off. The white matter in the crucible (chiefly of lime) was now lixiviated with water, till every thing soluble was taken up. The water thus employed, was mixed with some carbonate of ammonia, and filtered to separate the lime which it had dissolved in the state of sulphate. The water, thus nearly freed from lime, was reduced to a small quantity, by evaporation, and while still hot, was mixed with a few drops of solution of oxalate of ammonia, to throw down a little lime which had either escaped the action of the carbonate of ammonia, or had been afterwards supplied by the filter. The mixture was allowed to stand till it became clear, the liquid was then drawn off

## TABASHEER.

with a sucker, evaporated to dryness, and the saline residue exposed to a red heat. A salt remained, which weighed 0.2 grains, and which proved, on examination, to be sulphate of potash, equivalent to 0.11 grain potash.

Ten grains of tabasheer in the state of a fine powder were intimately mixed with 20 grains of anhydrous carbonate of soda, and the mixture exposed in a platinum crucible to red heat, raised at last sufficiently high to bring the whole into a state of fusion. The colour of the fused mass was yellowish brown. It was dissolved in muriatic acid, the solution evaporated to dryness, and the residue, after being digested a sufficient time in muriatic acid, was thrown on the filter. The silicaedulcorated, dried and ignited weighed 9 grains.

The muriatic acid, in which the silica had been digested being concentrated, was mixed with caustic ammonia. Yellow flocks, fell, which were separated by decantation: these flocks, when ignited, became dark brown, and weighed 0.1 grain; they dissolved readily in muriatic acid. The solution was super-saturated with caustic potash, and digested in the sand bath for 24 hours. By this means 0.10 grains of alumina was dissolved. The rest consisted of peroxide of iron. Thus, the yellow flocks thrown down by caustic ammonia consisted of Peroxide of iron,..... 0.09

Alumina,..... 0.01

0.1

The liquid from which this precipitate had fallen was not rendered muddy by carbonate of ammonia. It was, therefore, evaporated to dryness. A greyish matter remained weighing 0.08 grain. This matter being digested in muriatic acid, there remained undissolved 0.05 grains of silica. The 0.03 grain dissolved, consisted of a mixture of alumina, and lime.

Thus, the constituents obtained were:—

Moisture.....	0.487	or	4.87
Silica.....	9.050	„	90.50
Potash.....	0.110	„	1.10
Peroxide of iron.....	0.090	„	0.90
Alumina.....	0.040	„	0.40

9.777 97.77

The loss, amounting to 2.23 per cent., was probably the consequence of my employing different portions of the tabasheer in different steps of the analysis. For they were not all exactly the same in appearance. Hence, possibly the proportion of the constituents might vary somewhat in each. But my supply of tabasheer was not sufficiently great to admit of a new analysis upon a large scale. I did not weigh the lime; but do not think it could exceed 0.1 per cent. It is needless to observe, that the preceding analysis, accords sufficiently with the experiments of Mr. Smithson and Dr. Turner, and there-

## TAKIN.

fore, serves to confirm them. The tabasheer examined by Smithson, Turner, and myself was from India; that subjected to examination by Fourcroy and Vauquelin was from South America. It remains to be seen whether the constitution of the American tabasheer be essentially distinct from the Indian, as would appear from the 30 per cent of alkali &c. found in it by Fourcroy and Vauquelin.—*Thompson's Records of General Science, Vol. III. p.p. 132-35.*

(2853) TABOOT OR TAZEEAH, ARAB. A bier in the shape of a mausoleum, intended to represent the one at Kurbulla erected over the remains of Hoossain. It consists of a bamboo frame work, the interstices being filled up with a nicely clipped net work of paper, often pasted on mica. Within it are placed Ullums, or tombs to represent those of Hussun and Hoossain, but every variety of materials is employed, from the purest silver, to ivory, ebony, sandal wood, cedar, down to bamboo.—*Herklots.*

(2854) TAGAL, dry rice cultivation [equivalent to the Malay muah.

(2855) TAGETES PATULA. *Gool Jafree.* Pers.—*Genda*, Beng.—(Roxb.) This grows in gardens at Bombay; worn by native women in their hair.—*Graham (Thomson's Records of Gen Science, Vol. IX. p. 303.)*

(2856) TA-GOUNG, the ancient capital of the Burmese Empire.

(2857) TAH-NOUNG, is a most beautiful, though rather small tree. Leaves very small, composite, lively green, rising from the base of a double thorn.—*V. I. p. 188.*

(2858) TAKIN. *On the Takin of the Eastern Himalaya: Budorcas Taxicolor.* Blyth in *Beng. As. Soc. Jour. No. I. of 1850, p. 65.*

This remarkable animal adds another and a highly characteristic species to the group, and, when it is stated that this animal has its abode in the Mishmi mountains, or, in other words, in the Eastern Himalaya, all persons conversant with the features and climate [J. A. S. No. 135, for December 1847, and No. 206, for August 1849.] of all that locality will readily acknowledge the interest attaching to the discovery in our moist umbrageous and precipitous mountains, of this large and striking quadruped.

The large, massive and remarkable animal, denominated Takin by the Mishmis, and Kin by the Khamtis, is one of the group of Bovine Antelopes. Its nearest affinity is probably to the Gnoos; but it has various points of stronger connexion with Musk Oxen, and in a natural system its place would probably be assigned between those two types. But before making further allusion to its affinities, I shall give a careful description of its appearance and structure, premising the account of them by a statement of what is known of its habitat and manners.



## TAKIN.

The Takin tenants the easternmost part of the Himalaya, or that which is adjacent to Yunan, Sechuen and Kham. In the Himalaya it is stated to belong more especially to the Upper or Alpine region, but to be found also in the central region, though never in the lower region, [Notes, See J. A. S. No. 206, Phys. Geog. of Himalaya,] and it probably extends its range from the Himalaya proper, to the proximate mountains of China and Tibet. The Takin derives its high interest for the naturalist, not merely from its compound structure, made up, as it were, of the Ox, the Antelope, the Sheep and Goat, but also from its habitat, so remote and dissimilar from those of its allies. The Takin is described as being an animal of high courage and great ferocity; so that it cannot be taken alive, and is killed by the natives with much trouble and some risk. It is said to be very gregarious, though old males are sometimes found solitary; but, for the most part, the species herd together in considerable numbers. Strength and ferocity are inscribed in very legible characters on the form and aspect of the Takin, which is a much larger as well as bulkier animal than the lusty Caprine Antelope (Thar) of the Himalaya. The Takin however reminds one in several respects of the Thar, [Schinz in his *Genera Mammalium* has actually ranged this animal with the Gnoos. This is a mistake, but one indicative of remote affinity. The Thar is a typical *Nemorhedus*,—See J. A. S. No. 181. for July 1847.] which it much resembles in colour as well as by its short Caprine tail, harsh adpressed hair, and vigorous make, suited to climbing these stupendous mountains. But the Thar is in structure as much more Antelopine as the Takin is more Bovine. The latter is not much, if at all, inferior in size or bulk to the female Yak; and, as seen from the front especially, with its lunate horns displayed and its short tail, concealed, it would be at once pronounced to belong to the Ox kind, close examination alone being likely to suggest any doubts on that head. The Takin, as I have said, is nearly as large, both in dimensions of extent and in bulk, as a female Yák; and its massive form and peculiar proportions are quite Bovine. It is in length, from snout to vent, six and a half feet; and in height, three and a half feet at the shoulder. Its head is 20 inches. Its ears 5 inches. Its tail 3 inches, or 8 with the hair. The head is large and heavy, the neck short and thick, the body somewhat elongated but deep in the barrel, and yet more so in the shoulder, which is said to be raised in the Bison-tine manner. The limbs are short, stout and Bovine, and so are the broad hoofs. In Takin there is no approach to the Cervine limbs, or equine body and tail of the Gnoos: and the horns of the Takin, which to a superficial view are round, smooth and lunate, would complete the impression of a Bovine animal, were not progres-

## TALAPOINS.

sive attention almost necessarily now turned to the short narrow pointed ears, very short depressed tail, and hairy attenuated muzzle of this animal; particulars in which, with others to be presently mentioned, the Takin deviates from the Bovine to approach the Ovine or Caprine type, and is sundered from the Gnoos in the same degree, that it is approximated to the Musk Oxen or Ovibos.

The head of the Takin is large, heavy and inelegant, exhibiting a mixed character, compounded of the Bovine and Ovine types. Its vertical dimensions (or height) are great, owing to the lofty curve of the nose and forehead, the chaffron being more romanised than even that of the Barwal (*Ovis Barual*). But the length also of the head of the Takin is considerable, and surpasses that of any Caprine or Ovine head, though inferior to the full normal length of head, characterising the Ox tribe. The head, though large and upon the whole perhaps Bovine, yet lacks the characteristic squareness of the Ox's head, both jaws being attenuated towards their aural extremities much more than in the Ox, though somewhat less than in the sheep and goat. There is in the muzzle of the Takin neither the nudity nor the breadth of that of the Ox and Gnoo, but on the contrary the lips are both tapered and clad with hair almost as much as in the goats and sheep, and the animal is consequently a browser not a grazer. Nevertheless the mere nostrils, which are wide and terminal, have a decidedly Bovine character both as to form and position; and, as it were to remind us of the true Bovine muzzle, there is a clear broad margin round the nostril which is quite nude and moist.—*Beng. As. Soc. Jour. No 1 of 1850.*

(2859) TALAPOINS. According to the tenets of this religious order of Buddhist Monks, there exists an eternal law, which when obliterated from the memory of men, can be known again, and, as it were, recovered and only thoroughly understood, by the incomparable genius and matchless wisdom of certain extraordinary personages called Budhs, who appear successively and at long intervals during the various series or successions of worlds. These Budhs or Budhas announce that law to all the then existing rational beings. The great object of that doctrine is to point out to them the means of freeing themselves from the influence of passions, of becoming abstracted from all that exists; that being thereby delivered from the action of evil influence, which causes mortals to turn incessantly in the whirlpool of never ending existence, they may obtain the state of Neiban or rest, that is to say, a situation wherein the soul, disentangled from all that exists, alone with herself, indifferent to pains as well as to pleasures, folded, as it were, upon herself, remains for ever in an incomprehensible state of complete abstraction and absolute rest. A Budh is a being who, during

myriads of existences, slowly and gradually gravitates towards this centre of an imaginary perfection, by the practise of the highest virtues. Having attained thereto, he becomes, on a sudden, gifted with a boundless genius, wherewith he at once discovers the wretched state of all beings, and the means of delivering them from it. He thoroughly understands the eternal law which alone can lead mortals in the right way, and enable them to come out of this circle of existences, wherein they have been unceasingly turning and moving in a state of perpetual agitation opposite to that of fixity or rest. He preaches that law whereby man is taught the practice of those virtues which destroy gradually in him every evil influence, every affection for all that exists, and brings him at last to the end of existence, possession of Neiban. His task fulfilled, Budh dies, or rather to use the language of Budhists, he enters into the state of Neiban. In that situation which is truly inexplicable, he knows nothing of, and enters nowise into the affairs of this world. He is as if he was not, or had never been. Budhists venerate three precious things, Budha, his law, and the assembly of the just or perfect, in the same sense as we venerate and admire what is morally good and beautiful, such as virtue considered abstractedly and the acts originating from it. The statues of the last Budh, Gaudama, are honored by his followers, not with the idea that any powers or virtues are inherent in them, but solely because they are the visible representations of Budh, who desired that the same honor should be paid to them, as would be offered to his person, were he yet living among them. This faint outline of the Buddhistic creed is sufficient to bear out the above assertion, that it is in no wise based on the belief in a Supreme Being, but is strictly Atheistical, and therefore that no real priesthood can ever be found existing under such a system. It may prove too of some assistance for better understanding what is to be said regarding the subjects of this notice.

A Buddhist on becoming a member of this holy society, proposes to keep the law of Budh in a more perfect manner than his other co-religionists. He intends to observe not only its general ordinances obligating on every individual, but also its prescriptions of a higher excellency, leading to an uncommon sanctity and perfection, which can be the lot of but a comparatively small number of fervent and resolute persons. He aims at weakening within himself all the evil propensities that give origin and strength to the principle of demerits. By the practice and observance of the highest and sublimest precepts and counsels of the law, he establishes, confirms and consolidates in his own soul, the principle of merits, which is to work upon him during the various existences he has as yet to go through, and gradually lead him to that perfection which will qualify him for, and entitle him to the state

of Neiban, the object of the ardent desires and earnest pursuit of every true and genuine disciple of Budha. The life of the last Budha, Gaudama, his doctrines as well as his example, he proposes to copy with scrupulous fidelity and to follow with unremitting ardour. Such is the great model that he proposes to himself for imitation. Gaudama withdrew from the world, renounced its seducing pleasures and dazzling vanities, curbed his passions under the yoke of restraint, and strove to practise the highest virtues, particularly self-denial, in order to arrive at a state of complete indifference for all that is within or without self, which is, as it were, the threshold of Neiban.

Like the monk, the Talapoin bids a farewell to the world, wears a particular dress, leads a life of community, abstracts himself from all that gives strength to his passions, by embracing a state of voluntary poverty, and absolute renunciation of all sensual gratifications. He aims at obtaining by a stricter observance of the law's most sublime precepts, an uncommon degree of sanctity and perfection. All his time is regulated by the rules of his profession, and devoted to repeating certain formulas of prayers, reading the sacred scriptures, begging alms for his support &c. These features of exterior resemblance common to institutions of creeds so opposite to each other, have induced several writers little favourable to Christianity, to pronounce without further enquiry that Catholicism has borrowed from Buddhism many ceremonies, institutions and disciplinary regulations. Some of them have gone so far as to pretend to find in it the very origin of Christianity. They have however been ably confuted by Abee Remusat in his *Memoir intituled Chronological Researches into the Sanaic Hierarchy of Thibet*.

It is somewhat surprising to find in the middle of half civilized nations, such as the Burmese, Siamese, Cingalese, and Thibetans, a religious order with a distinct and well marked Hierarchy, constitution and regulations, providing for the admission of members, their occupations, duties, obligations and their mode of life, forming as it were, a compact, solid and perfect body, that has subsisted almost without change during several centuries, and survived the destructions of kingdoms, the fall of royal dynasties and all the confusion and agitation produced by political commotions and revolutions. It is in Thibet, that the order is found existing in the greatest perfection, under the fostering care of the Great Lama, or High Priest, who combines in his own person the regal as well as the sacerdotal dignity and power. In the city of Lassa, a Pontifical Court, an elective sacerdotal chief, and a college of superior Lamas, impart to the order, dignity, decency, respectability and stability, which insure its continued existence, and more or less extend its influence over its members living in distant



countries, ruled by a foreign sovereign. The period of the introduction of Buddhism from India into Thibet, is very uncertain, if not quite unknown, but it appears certain, that the establishment of a Pontifical chief or sovereign, with royal prerogatives, was set up by one of the grandsons of the great Tartar warrior Gengis in or about the middle of the thirteenth century. In other countries, where the order has no connection whatever with the civil power, we expect to see it surrounded with an equal splendour, or subsisting in the same state of perfection, regularity and fervour. Extraordinary indeed would be its vital energies, were the remotest parts of this great and far spread body to receive the same impulse and exhibit the same symptoms of vitality as those nearest to the heart or principle of life. Having never met with any detailed particulars regarding the Thibetan Monks, I must remain satisfied with laying before the reader, an account of all that relates to the constituent parts of the order, such as I have found them existing in Burmah, and developed in their sacred writings.

The whole fraternity is composed, 1st, of young men who have put on the Talapoinic dress, without being considered professed members thereof, or having hitherto passed through a certain ordeal somewhat resembling an ordination; they are called Shung: 2nd, of those who having lived for a while in the community, in a probationary state, are admitted professed members with the ceremonies usually observed on such occasions whereby the title and character of Talapoins are solemnly conferred—they are denominated Pazin: 3rd, of the heads of each house or community, who have the power to control all the inmates of the house: 4th, of a Provincial, whose jurisdiction extends over all the communities spread over the towns and villages of one Province or District: 5th, of a superior general, residing in the capital or its suburbs, called Haia Daw or great master, having the general management and direction of all the affairs of the order throughout the Empire. In the kingdom of Ava, the key-stone of the Talapoinic fabric is the superlatively great master residing in the capital or its suburbs. His jurisdiction extends over all the fraternity within the realm of his Burmese Majesty.—*Jour. of the Ind. Arch. Vol. IV. No. V and VI. May and June 1850, page 223.*

Talapoins, are known under different names in Ceylon, Siam, and Thibet, conveying nearly the same meaning, and expressing either the nature or the object of their profession.

This order of Buddhist Monks is known also as "Bonzes." The former word is derived from the Pali, "Talapat" meaning the leaf of a palm tree. These two words are used by the Siamese to designate the large fan made of palm leaves, set in a slender wooden frame, which Talapoins carry with them

when they go abroad. The votaries of Buddhism in Ceylon, Burmah, and Siam, Thibet, &c. show the greatest respect to the Talapoins. They are called by the Burmese Phonghis, which term means great glory, or Rabans which means perfect.

(2800) TALPA. The species of restricted *Talpa* that have hitherto been described amount to four only in number, viz. *T. europæa*, L., of Europe generally,—*T. cæca*, Savi, of Italy and Greece,—*T. moogura*, Temminck, of Japan,—and *T. microura*, Hodgson, of Nepal, Sikim, Butan, and the mountains of Asam: but the society's Museum has long possessed specimens of another from Cherra Punji, (N. of Sylhet), which I have recognised as distinct for some years, but now only proceed to describe.

In its external characters, the Cherra Punji Mole differs little from *T. microura*, except that the tail is considerably more developed, though much less so than in *T. europæa*; and the latter is clad and tufted with white hairs, whence I propose for the species the name of *T. leucura*. This animal, also, would seem hardly to attain the size of *T. microura*. An adult female in spirit measures  $4\frac{1}{2}$  inch long, with tail  $\frac{3}{8}$  inch additional: the latter is of a club shape, much constricted for the basal half. The general colour of the fur, too, is less fulvescent than is usual with *T. microura*. In both of these Asiatic species, as in *T. cæca*, there is no perforation of the integument over the eye, as in *T. europæa*; the skin being there merely attenuated and imperfectly transparent.

But the characteristic distinction of *T. leucura* consists in having only two small præmolars in the upper jaw anterior to the great last præmolar (*carnassiez*, or 'scissor-tooth'); both *T. europæa* and *T. microura* having three,—these being comparatively larger and less separated in the latter, and the *carnassiez* is also much larger in *T. microura* than in *T. europæa*. The posterior spur of the canine (? or pseudo-canine) [Note. In all the Insectivora, Cuv., which apparently possess upper canines, these teeth have rather the structure of *modified false molars*, and, I believe, have always double fangs, as exemplified by *Talpa*, *Centetes*, and *Gymrura*.] is remarkably developed in *T. leucura*, in place of the absent small præmolar. In the dentition of the lower jaw, there are also characteristic differences distinguishing these three species. In the Moles, as in most other Insectivora, and also in the *Lemuridæ* (the very peculiar genus *Cheiromys*, which has rodential tusks, excepted), the lower canine is minute and takes the form of an incisor, for which it has been very commonly mistaken; [Note. No placental mammal has more than three pairs of true incisors, or than three pairs of true molars (distinguished by their not being proceeded by deciduary teeth in the young animal, as is the case with all other teeth). Although certain in-

## TALPA.

stances occur, as especially in the hoofed ruminants, where the lower canine is hardly (if at all) to be distinguished from the incisors, yet this fourth supposed pair of incisors never co-exists with an undoubted canine (vide the Camels, Horses, Tapirs, &c.), that is among the *placental* mammalia, inasmuch as they are the veritable homologues of those teeth.] and the first præmolar is developed to assume the form of a canine, but locks *posteriorly* to the upper canine (or pseudo-canine, and like it has a double fang). There is no instance of a genuine lower canine locking behind the upper one, unless the gnawing tusks of the *Rodentia* and of the Lemuridous *Cheiromys* be regarded as the homologues of canines, which seems to be indicated more by the co-presence of undoubted upper incisors in the Leporidae, than the reverse is by the difficulty of always tracing the origin of upper rodentia tusks through the intermaxillaries to the true maxillary bones in the rodents generally. But to return to *Talpa leucura*: following the minute lower canine and the canine-like first lower præmolar of this species, there are two small præmolars anterior to the *carnassiez* or last of the series, and the first of these is conspicuously much smaller than the second; in *T. microua* the two are of equal or nearly equal size, and occupy more space longitudinally.

Both scissor-teeth are indeed most developed in *T. microua*, and the teeth generally are more robust.

The specimens of *T. microua* from Asám, like those of the Nepal, have generally a very minute tail, which can at least be distinctly enough felt under the fur; but those from the vicinity of Darjiling have no external trace of tail, whether sent as skins or in spirit. I have found, however, no perceptible difference in the skulls and dentition, nor in any other character whatever, that should warrant us in considering the tailless Darjiling Mole as a distinct species, separable from *T. microua*. The Society's museum contains *T. leucura* stuffed and in spirit, and the skull of the specimen preserved in spirit has been extracted and cleaned; while the dentition of the stuffed specimen is exposed, and is quite similar to that of the other here described. It is not improbable that *T. leucura* may extend its range eastward into China; and in that direction we may look for additional species of *Talpa* if not also in western Asia. In Africa the genus is unknown, but is represented in the south by *Chrysochlore*; in N. America by *Scalops* and *Condylura*; while in S. America the *Insectivora*, Cuv., do not occur, their functions being performed by numerous diminutive species of *Didelphys*, as also may be said in Australia by the *Perameles* tribe; and it is far from unlikely that Australia may yet be found to produce a fossorial marsupial form, resembling the Moles as other *Marsupialia* present an analogical but superficial

## TANKOEBAU PRAHOE.

likeness to certain other *Insectivora*.—*Journ. Ben. As. So. p. 215, No. III. of 1850.*

(2861) TA-LAIN-NO, *Burm.* is a vine which attains a diameter of eight or twelve inches. Fruit yellow, pear-shaped, acid, with six or eight stones, size of an egg.—*Malcom, Vol. I, p. 180.*

(2862) TALLE TANGA, the Malayala and Tamil name of a tree, which grows to about two feet in diameter, and thirty feet high. It is the tree that produces the jungle-almond, on which the monkeys and other animals of the forest feed. The natives cut this wood into boards for boats and house-building: they also make it into canoes, which are said to be durable. The boats are sewed together by coir-yarns.—*Edye, M. and C.*

### (2863) TAMARIX INDICA.

The tree.

Jhao.

Tourfa.

The galls.

Sumrut-ul-Turfa.

Buree mne.

### (2864) TAMARIX DIOICA.

### (2865) TAMARIX ORIENTALIS.

The tree.

Furaa.

Asul-atul.

The galls.

Sumrut-ool-Asul.

Chotee Mue.

This plant sometimes secretes a saccharine matter allied to manna caused by a species of coccus which attacks the tree. A shower of this kind of manna fell at Agra in February 1855.

(2866) TAMBOGUM in Tamil, and Vanponga in Malayala.—This tree is remarkably heavy and close-grained, and was considered very similar to the timber then imported into British dock-yards from Africa, named African Teak, No. 1. It grows from thirty to fifty feet long, and about thirty inches in diameter, and is used by the natives where strength and durability are required, and weight is of no consideration. It produces a fruit or berry, which the natives reduce to meal, with which they make cakes, curry, &c.; the berry is much like coffee in shape and size.—*Edye M. and C.*

(2867) TANGUNS, Retanguns, or tanyans, of Nepaul, so much esteemed in India for their hardness, come entirely from Upper Thibet; and, notwithstanding their make, are so sure-footed that the people of Nepaul ride them without fear over very steep mountains and along the brink of the steepest precipice.—*Smith's Nepal.*

(2868) TANI in Tamil, Jellam in Malayala, which means waterwood. This tree grows to about two feet in diameter, and forty feet high. It is remarkably soft and porous, and contains a great quantity of water: when it is felled it is of little use; and is considered as one of the inferior kinds of jungle wood.—*Edye, M. and C.*

(2869) TANKOEBAU PRAHOE, a volcano in Java, with a crater from which the eruptions of 1829 and 27th May 1846 issued. Dr. Horsfield paid a visit to it in 1804.



## (2870) TANK KESRA OF CTESIPHON.

This building formed part of the Royal palace of Ctesiphon, and is called by the Arabs Tank Kesra. The palace was commenced by Sapor II, the ninth King of the Sassanian dynasty, at the beginning of the fifth century. It was added to about a century later by another king of the same line, Nooshirwan, usually called Khoosroo I, and was finished by his grandson, Khoosroo Perweez or Khoosroo II. The part remaining is merely a portion of the facade and one of the halls of audience,—not a tenth part probably of the original building. It was covered with brilliant white stucco, and the halls were decorated with historical paintings and figures of the heavenly bodies. It was taken from the Persians by the Arabs in the time of the Caliph Omar, in the sixteenth year of the Hejra, and was called by them the "White Palace." Its splendour and magnificence as related by the Arabian historians is scarcely credible. The dimensions of the hall are,—105 ft. in height, 95 ft. in width, and 180 feet in length.

The building remained entire till the time of the Caliph Al Mansoor, who endeavoured to destroy it in order to make use of the materials in the construction of his Palace at Baghdad. At the close of the ninth century, the Caliph Muk-tassi Billah regularly unbuilt the White Palace, in order to erect his famous edifice called the Taj, at Baghdad, and merely left this hall as a specimen of the Sassanian Architecture.

(2871) TANA, the Tamil name of a tree which is hard and heavy. It is used by the natives in house-work, and for implements of agriculture when it can be procured. It is very scarce.—*Edye. M. and C.*

(2872) TAN TAE HOEY of Singapore. A description given of the initiation into this Combination is as follows:—

About 7 o'clock they had all arrived and commenced to eat and drink spirits, which they did with a noise like battle. In about an hour this finished, when they commenced to play on drums &c. the music of which was exceedingly loud. On this they all arranged themselves in order sitting opposite the Datu, (idol) but I observed that their faces were as red as the Bunga Rayah, from drunkenness. Among them all there was one chief, who sat on a lofty chair, with two men standing at his right, and two at his left. After them came eight men with drawn swords, who arranged themselves, at the right and left; then came one man, who burned paper in front of the idol (sacrifice), after him came eight men, with drawn swords who guarded a man with dishevelled hair, and without any upper garment, in fact he had only a pair of trowsers. This man came in front of the chief, and bowed down till his head touched the ground, the armed men on the right and left now advanced, shouting, and laid their swords on his neck, they remained

silently in this position, for a short time, when a man advanced to the candidate's side. The chief then spoke as follows in the Chinese language, (this was translated afterwards at my request):—"Who are you, and from whence come you? Who are your father and mother? Are they still alive or are they dead?" These questions were explained to the candidate by the man who stood at his side, and were answered as follows:—"I am such a one, of such a country, and my father and mother are both dead," even if his father and mother were alive, he would be obliged to say they were dead, because no one whose father and mother are alive, can be admitted into the society, as the existence of all those is as if they were dead to the world and its ties. The chief then said, "will you swear that your father and mother are dead?" He answered, "I will," and performed the oath by burning paper in front of the idol, saying at the same time, "my father and mother are dead." The chief then said "what have you come here for?" answer "I wish to join the Tan Tae Hoey." These words mean the sky, the earth and man.

The chief then said "you are deceiving, your thoughts are not as your speech" answer "I will swear that I am in good faith"—"then swear," the candidate then taking paper, burned it while he repeated his assertion. The chief then said, "are you acquainted with the rules of the society?" answer "yes, I understand that I am required to take an oath, by drinking blood." The chief then said something to which the following answer was made:—"I promise not to divulge the secrets of this society to any one under penalty of death." The chief said, "truly"—answer "truly." A vessel was then brought containing arrack and a little blood from each of the members of the Society, and, with a knife, was placed in front of the idol. The candidate then taking up the knife made a slight cut in his finger, from which he allowed some blood to fall into the cup. The chief then said "drink in presence of Datu Peking." The candidate then drank a small cupfull, on which the chief, and all the confederates, drank a little, each in his turn. The chief then said "to-morrow go to our Secretary, and ask him for a book, in that book you will find all our rules and secret signs; you will pay one dollar for it." The chief then rose, and himself raised the candidate from his prostrate position and now being initiated, he can take his place among those who, before, would have considered him an enemy.—*Statement of Abdoolah bin Abool Kadir Moonshee.*

(2873) TÆNYO, *Burm.* PINE, of several varieties, is abundant in the dry and hilly districts, reaching a good size, often fifty feet without limb. One or two species are found in the Tenasserim provinces, but not frequently. It is neglected as timber because of its softness and exposure to

## TAXIDIA LEUCURUS.

ants. Some turpentine is manufactured from it. Pieces of it are every year washed down the Irrawaddy. As all India now depends on European and American spars, which often sell at most exorbitant prices, it is probable that Burmah will one day be enriched by the export of spars.—*Malcom*.

(2874) TAPOZOUS LONGIMANUS, a bat described by General Hardwicke. There are three Indian species of this genus.

(2875) TASMAH BAZEE THUGS. A Hindoostanee term applied to a class of these professional murderers of India, who destroyed their victims by means of a Tasmah or belt.

(2876) TATTOOING. The people of Burmah still follow the practice of tattooing their bodies, tracing on various parts, the figures of animals or plants, in a manner so pleasing that British officers have often been attracted to submit to the painful and barbarous process. The Hindoo women of Southern India, likewise occasionally tattoo their fore-arms from the wrist to the elbow.

(2877) TAU-MA-GYEE BURM. (*Elæocarpus*) is generally very large. Grain, clear and straight; timber highly prized.—*Malcom*. V. 1. p. 188.

(2878) TAN-THE-AH BURM. (*Hopea floribunda* of Wallich). Very large, somewhat abundant, and a useful timber. *Malcom* N. 1. p. 188.

(2879) TAWNI in Tamil, TANIKI MARUM in Malayala.—This tree grows to about three and a half feet in diameter, and from thirty to forty-five feet long; it is of a whitish colour, and is used by the natives for catamarans, canoes, &c. It produces a fruit which the native doctors use as a purgative, in cases of fever, &c. the timber is not durable or of much use.—*Edye, M. and C.*

(2880) TAXIDIA LEUCURUS, the Tibetan Badger.

Carnivora.

Subplantigrada,

Arcto galida. H. Smith.

Genus Meles.

Subgenus Taxidia.

Species new. T. Leucurus, Hodgson.

Tumpha of the Tibetans.

Habitat. The plains of Tibet.

There is not yet, I believe, any record of the Badger as an inhabitant of the east. The occurrence, however, in the sub-Himalayas of the allied forms of *Helictis*, *Urva*, and *Ursitaxus*, has led me for some time past to expect such a discovery in the Himalaya or Tibet, and my anticipations have just been fulfilled by the receipt of a very fine specimen of the Badger from the neighbourhood of Lassa.

The Tumpha or Tibetan Badger is in total length 37 inches, whereof the tail, with the hair, is 10 inches, and without it 7. The head is  $5\frac{1}{2}$  inches, the palm and nails  $3\frac{1}{8}$ , the planta or rest of the hind foot, from heel to end of the nails, 4, the longest claw or nail,  $1\frac{1}{4}$ , the ear  $1\frac{1}{4}$ , the

## TEMBOW.

longest hair of the body,  $4\frac{1}{4}$ . The aspect is entirely that of a long-tailed Badger, with somewhat smaller head and longer finer fur than usual. The small head is conico depressed with remote ears and eyes, and sharp elongated face. The muzzle or rude extremity of the nose is clearly defined, rounded, prolonged beyond the teeth, and has an abrupt oblique termination in front. The oval nostrils are opened entirely to the front, their lateral prolongation being merely linear and very much curved. The lips are thin and almost void of moustaches, and there is a still fainter indication of the tufts proper to the cheeks, chin, and eyebrows. The small pig-like eyes are situated midway between the ears and tip of the snout. The ears are oval, well developed and tending to a point.—*Mr. Hodgson in Jour. Ben. As. Soc.*

(2881) TAXUS BACCATA. Himalayan Yew.

Thoono, HIND.

Thuneer, „

Zurnub, HIND.

The leaves of this tree are sold in the Bazaars of the N. W. Provinces of India, under the name of "Burmee" or "Zurnub." *Taxus baccata* "Tingschi" is the yew whose timber is red. It is comparatively scarce in Sikkim.—*Hooker, Vol. 1, page 45.*

(2882) TAY, BURM. Ebony, vide *Diospyros ebenum*.

(2883) TEA. In 1858, Dr. Jameson up to the middle of March, had dispatched 5,300lbs. to the India House. He had sold about 12,400lbs. to the public at large, and made over 27,200lbs. to the Commissariat. So soon as Rohileund was re-occupied, he would have from 17,000 to 18,000lbs. ready for the Commissariat, or a grand total of 62,900lbs. Above five lacs of seedling plants and 36,000lbs. weight of seed had been sold in the course of the year to private parties.—*Bombay Standard, April 17, 1858.*

(2884) TEJBUL. Capsules and seeds of several species of *Xanthoxylon*.—*Ben. Phar.*

(2885) TELLE, or PAYANE, the Tamil and Malayala names of a tree which is found on the coast of Malabar and in Travancore, about sixty feet in height, and two feet and a half in diameter. It is an inferior sort of pine, and is named by natives Dupi-marum. It produces an inferior sort of damar, or resin, which is boiled down with cocoa-nut oil. When thus prepared, it is a substitute for pitch or resin, but very inferior. The wood is used for the masts of pattamahs, catamarans, canoes, &c., but it is not durable.—*Edye, M. and C.*

(2886) TEMBOW, or BLACK-HEART WOOD. It grows in the Malabar forests to about eighteen inches in diameter, and from twenty-five to thirty-five feet in height. It is considered a useful wood by carpenters for general purposes in house building, and for native



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vessels, and implements of agriculture.— *Edye M. and C.*

(2887) TENASSERIM PROVINCES, being remarks on their Metalliferous Deposits and Mineral Productions, By EDWARD O'RILEY, Esq.

The principal metallic ores of these provinces of which the localities are known, are those of tin, antimony, iron and lead (galena); in addition to these however, specimens of the carbonate of lead, the sulphurets of copper and bismuth, and an ore of silver in combination with copper and antimony, have been obtained through the agency of the wandering tribes of Karens who inhabit the hilly regions of the provinces; the sites of the latter have still to be investigated; but such researches must be the work of untiring application to secure the good will of these sons of the forest, whose local experience is so intimately connected with the end to be attained.—

The known localities of the *stream tin* are as follows :—

1. The mines of Malewan and the tributaries of the Pakchan river.
2. On the Bokpyn river to the northward of the above.
3. In the upper branches of the Lenya river.
4. On the Thengdau river in the vicinity of the coal mine on the Great Tenasserim.
5. At Thaban-liek on the little Tenasserim river.
6. At Kamoungtan, Engdan and Thapyan in the same locality, but not so accessible as Thaban-liek.
7. At Yamon about 20 miles from Mergui, on the south side of the Great Tenasserim river, of an inferior quality, being mixed with wolfram sand or tungstate of iron.
8. In the Toung Byouk valley, a little to the southward of Tavoy river.
9. At the head waters of the Great Tenasserim to the eastward of Tavoy—noticed by both Dr. Helfer and the Rev. Mr. Mason.
10. In the upper courses of the streams which flow into the Bay of Henzai (a beautiful spot on the coast situated between Tavoy and Ye) the ore obtained from this locality contains grains of gold and garnets.

### Mine Tin.

11. Is found in the hill of Kahan near Mergui in a decomposed granite matrix passing through the sandstone. This hill is in fact a repository of mineral wealth which not even the richest (Tin) mines of Cornwall can excel, as will be seen from the remarks which follow.

The following statement shews the ascertained relative qualities, and the cost of production of the tin deposits of Banka, the Malay Peninsula, and these Provinces at a cost of per cwt.

100 parts Banka ore yield	58 parts of metal...	Rs. 11	6	As.
do. Malay Peninsula	do. 65-77...	" 13	4	"
do. Mergui Province	do. 70-75...	" 13	10	"
do. Kahanode Tin	do. 80-82...	" 13	10	"

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Captain Tremenheere reports as follows, to Government on the tin deposits of the Mergui provinces (31st August 1841.)

"The streams themselves are rich in tin, which may be collected from the beds in considerable quantities. The process by which it has been deposited for long periods and for many miles along the line of valleys throughout which they flow, appears to be in active operation at the present day—crystals of the peroxide of tin washed down by the rains and deposited with sand and gravel in their beds may, by changes of the rivers caused during the freshes, be quickly covered with a few feet of gravel and soil. The older deposits have, as far as my observation extends at present, the same alluvial character, and it would be well in future operations to have regard to the levels in which the streams may have formerly run.

"First locality visited.—The Thengdau river, on the Great Tenasserim. A Shan employed for the purpose collected at this spot 11,889 grs. of ore, equal to 190.198 grs. pure metal, in an hour and a half.

Second locality visited.—Tha-ban-liek, on the Little Tenasserim. Great production in the bed of the stream. The produce of a day's labour of two men ascertained : 5 lbs., 2 oz., 383 grs. of pure tin, at a cost of 12 annas, exclusive of the expences of reduction to the metallic state.

From the trial of the produce of one man's labor in a given time, there appears to be sufficient to justify every expectation of a profitable employment of labor on an extensive scale : the result can only "be considered rough approximations to the probably outturn of tin with an establishment properly superintended."

Kahan, a small hill on the right bank of the Great Tenasserim, 4 miles from Mergui. "The tin occurs here differing much from that of the localities above mentioned; the hill is composed of a soft friable white sandstone rock, the ore is found in the crystallized form interspersed in decomposed granite, forming a vein about 3 feet wide enclosed by the sandstone rock.

"In about a quarter of an hour a few baskets of the decomposed granite were removed, which produced an amount of crystallized peroxide of tin equal to 63,176 grs. of pure tin.

"This locality appears to be of a very promising description, and I have little doubt that if the work were aided with ordinary skill and means, a tin mine here would be exceedingly productive. A vein of tin is in fact exposed to the day, and, and would only require for a considerable period of work, the precaution of well supported galleries and shafts to allow of its contents being easily extracted.

"The Kahan hill is I conceive an indication of a valuable repository of tin. It is but a quarter of a mile from the creek communicating with the river, which is accessible to any boats. Its

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proximity to Mergui offers also great facility for procuring labor and supplies.

"The localities therefore which appear to hold out the best prospect for tin ore, are for stream tin the Tha-ban liek and Theng-lau, and for mine tin Kahan hill. They all produce tin of the same nature and quality, viz. crystals of native peroxide, being a combination of oxygen and tin only.

"The crystallized form in which the ore has been found renders its separation extremely easy, and the whole process of stamping and dressing, which in England are tedious and expensive operations can thus be dispensed with, no arsenic or sulphur being mixed with the ore, it need not be roasted before it is placed in the furnace.

It will thus be seen that the tin of Mergui offers no ordinary inducement to the outlay of capital, without much of the risk, uncertainty and large previous outlay usually attending mining adventures."

Captain Tremenhare's second report to the Military Board on the tin of Mergui, October 1842, after noticing the rich deposits of "Kahan" proceeds as follows:

"Experimental operations have been in progress there by the order of the Commissioner Mr. Blundell, with a view to ascertain the value of the spot for mining purposes, and I am happy to have it in my power to state, that they have been attended with the most complete success; more than 8 cwt of the ore ready for smelting has been collected by a gang of convicts, in which are bulky specimens of maced crystals, which in weight and size surpass any thing I have ever seen in Cornwall or in cabinet specimens.

"The upper portions of the decomposed matrix of the ore which have been exposed to view at the surface, appear but indications of a most valuable repository of tin, from which have been extracted specimens of great weight and richness, consisting of large maced crystals of tin on quartz, and contain more tin in proportion to the bulk than any specimens I have before seen—the largest, which measured about 14 inches square by 12 deep, was so heavy, as to require some exertion to hold it steadily in both hands. The stratum of tin soil was ascertained to be upwards of 12 feet thick! The "Kahan" ore gave on analysis only 0.91 per cent of metallic iron and is believed to be pure from the tungstate of iron and sulphur."

Captain Tremenhare reports as under, on the tin deposits of the Pak-chan.

"Malewan and the tributaries of the Pak-chan. The greatest quantity of clean ore obtained from one trough full of soil was 2,078 grains; the time occupied in each washing 5 to 6 minutes.

The workmen stated that in the rains one man would even earn four rupees worth of tin per day. These productive seams are however

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but the index of what is to be found elsewhere, and if these localities ever attract the European capitalists, of whose notice I have believe them well worthy, the proper sphere for the scientific miner should be in the hills themselves. There, if a little cautious investigation were previously made by practical men in search of a spot for mining operations, the use of the common horse "whem," or the most ordinary draining operations, would in my opinion, in the course of a very short time, discover veins which it would be very profitable to follow out with more complete apparatus." The late Dr. Helfer in his letter to Mr Commissioner Blundell on the tin deposits at the head of the Great Tenasserim writes thus: "I have made one excursion to the eastward from this place (L'avy) crossing over the Tenasserim river to the supposed boundary: my chief aim was the tin mines, and I am greatly satisfied with them; they are very productive and very extensive; only, because the people do not understand to work them, and because no European who understands it knows of them, they lie waste; but on a large scale worked with a capital of 20,000 rupees to commence with, one would soon become a "millionaire."

Of the value of such testimony as the foregoing there can be but one opinion; coming as it does from an officer of known scientific attainments and well acquainted with the vast mining operations of his native country. The wonder is, that the Supreme Government of India should have allowed these reports to pass into oblivion for so long a period, instead of causing them to be circulated through the capitalists at home, with offers of the most liberal consideration to any parties undertaking their development.

*Antimony.* The sulphuret ore of this mineral appears to be pretty general throughout the provinces; accompanying the sandstone of the older formation, in which it is found forming veins of various dimensions which ramify in all directions from the principal vein. Several localities in the sandstone range of hills enclosed by the Attaran and Maulmein rivers have been worked, but it would appear that the expenses attending the operation are too heavy to admit of a profitable investment of capital therein, the localities of these deposits being generally at some considerable distance inland, without roads and water or water conveyance in the vicinity, and the labour attending its extraction from a hard matrix of the nature of the sandstone, oppose a formidable barrier to this article ever becoming important in the exports of the provinces; and until it be found in the mass on the banks of some of the navigable rivers, or similarly situated to the deposits of Borneo, the competition with the Singapore market to supply the limited demand in the home markets must remain as now, impracticable.

*Sulphuret of Bismuth* occurs with the ore



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of antimony in the sandstone range of hills described in noticing that ore; its importance as an article of commerce is of secondary character, but should it be found to be present in any considerable quantities, the reduction of the metal from the ore would doubtless prove profitable, its price for the home demand being from 2s. to 2s. 6d. per lb.

**Gold.** Has been collected in small quantities from several of the tin streams having their sources in the older formation of the boundary range of mountains; that obtained from the head waters of the Tavoy river, as also from the streams which empty themselves into the Bay of Hénzai, where it is found mixed with the tin ore, is of a quality equal in every respect to the gold dust of the Malay peninsula. It does not however appear to be in sufficient quantities to induce the establishment of permanent washings, altho' the Siamese have for many years derived a considerable revenue from the produce of the streams which form the eastern watershed of the same range of hills.

**Coal.** The tract of country enclosed within the 11th to the 14th degree of north latitude, may be said to form a vast coal bed, or series of coal measures, and in that space, principally in localities through which the great Tenasserim river and its branches flow, coal has been discovered in six different outcrops, widely separated from each other and as widely varying in the quality of their deposits. Of the whole of the foregoing, but one single locality, situated on the great Tenasserim river in lat. 12°21' N, and long. about 99° E. and distant from the port of Mergui by water about sixty miles, has hitherto claimed the attention of Government in the extraction of the coal. The quality of the material thus obtained will be evident from the following analysis of it made by order of the Bengal Coal Committee in 1840.

*Spec. grav. 1.27*

Water,.....	9
Volatile matter,.....	46
Carbon,.....	40
Ash,.....	5

100

Notwithstanding this favourable exposition of its quality and adaptation to steam purposes, and the cheap rate at which it could be laid down for the steamers at Mergui, viz. 5½ annas per maund, the undertaking was abandoned shortly after its commencement, on the discovery that the coal passed the dangerous property of spontaneous combustion, to which cause the loss of the Steamer "Madagascar" on the coast of China, which had taken her supply of fuel from the coal of the Mergui mine, was attributed.

By far the most important discovery of coal in these provinces is that which was examined

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and reported upon by the late Dr. Helfer, situated at the source of the little Tenasserim river, where it is found out-cropping at the surface in five different localities, forming the same bed, the quality of this deposit appears from the following analysis of it to be unexceptionable, not excelled in fact by the best English coal for steam purposes.

Bituminous volatile matter,.....	47
Carbon,.....	52
Ashy deposit,.....	1.8

In parts,..... 100

The quantity exposed to the day would indicate an inexhaustible supply below, and as the process of extraction in the first instance to the extent of many thousands of tons could be confined to open workings, without the necessity of expensive appliances of machinery, the question naturally arises, why has this invaluable deposit been neglected, and what are the present existing causes that retard a further investigation of it.—*Journ. of the Indian Archipelago, December 1849, p. 379.*

(2888) **THIALICTRUM FOLIOLOSUM**  
NAT. ORD. Anemoneæ. Pelijurree Hind : grows at Mussorie and the Himalayas generally. Its root in doses of 5 to 10 grains, acts as a tonic and aperient and is given in the interval of intermittent fevers and in convalescence from acute diseases. It promises to succeed well as a febrifuge of some power and an aperient of peculiar value.—*O'Sh. p. 161.*

(2889) **THANY MARAM.** This is a tree common about Nelambore and in Coorg; wood much used but not durable being very liable to be attacked by insects.—*McIvor, M.E.*

(2890) **THIBET**, is reckoned by Gutzlaff in his 'Life of the Emperor Taou Kwang,' page 227, to comprise an area of 30,200 square miles; and to have a population of about six millions. Thibet, as thus indicated in the enumeration of the dependencies of China, embraces, I believe, Little Thibet or Balti, the capital of which is Iskardo; Western Thibet the principal town in which is Leh and Thibet Proper or Eastern Thibet, having Lassa as its capital and chief city.

The latest and best account of the Trans-Himalayan regions, is 'Dr. Thomson's Travels,' published last year in London.

Following Humboldt, Dr. Thomson divides Thibet into two grand divisions: the western one, of which he treats so ably himself, and the eastern one, to which alone my notes refer. Western Thibet—according to Dr. Thomson "is a highly mountainous country, lying on both sides of the Indus, with its longer axis directed like that river, from south-east to north-west. It is bounded on the north-east by the great chain of mountains, to which Humboldt, following Chinese geographers, has given the name of Kounlun, by which it is sepa-

rated from the basin of Yarkund. On the south-east, its boundary is formed by the ridge which separates the waters of the Indus from those of the Sanpu." "To the north-west and south-east," continues Dr. Thomson, "its boundaries are somewhat arbitrary, unless the political division of the country be had recourse to, which, depending on accidental circumstances, entirely unconnected with physical geography or natural productions, is so liable to change that its adoption would be extremely inconvenient. The best mode of drawing a line of separation between India and Thibet, in those parts where mountain chains are not available for the purpose, appears to consist in regarding the latter to commence only at the point where the aridity of the climate is too great to support forest trees, or any coniferous tree, except juniper."

"As limited by these boundaries, Western Thibet includes the whole valley of the Indus, and its tributaries down to about 6000 feet above the level of the sea: a considerable portion of the upper course of the Sutlej down to between 9,000 and 10,000 feet, and small portions of the upper course of the Chenab, of the Ganges (Jahnāvi) and of the Gogra."

The above is a very elaborate definition of boundaries, founded mainly, as regards the limits of India and Thibet on the geographical distribution of plants. By it the Himalaya, so well known to Dr. Thomson, is annihilated as a mountain chain. The Kounlun however which no body knows anything of, and which may be quite as frequently cut through by meridional rivers as the Himalaya, is admitted to that distinction.

I shall now endeavour to describe the second grand division or "Eastern Thibet." It is by all accounts an exceedingly mountainous country, i. e. it contains immense masses and ranges of the most rugged mountains in the world interspersed with extensive plateaus and deep level-bottomed valleys along the streams and rivers.

The Thibetans I have met with, do not recognize a continuous chain of mountains running parallel to the Himalaya; nor are they acquainted with "Kounlun" as the name of any mountain range. They are familiar with the Himalaya on one hand and call it "Kangri," which simply means, *Snowy region*, and they know that the country of the Mongols, or Mongolia lies parallel to it on the other hand. The third great distinguishing feature in the physical geography of Eastern Thibet is the Yaroo river or Sanpoo of our maps. Thus characterised, I shall say that in popular estimation—which is not founded on the physical features of the country, on its natural productions, or on political divisions of territory, separately or jointly,—Eastern Thibet is bounded on the north-west by the Kangtisee range of mountains, [Note. The highest portion of the "Kangtisee" range is I

believe the "Kylas," of Strachey] and a greatly elevated tract of country extending from the base of this range; on the north by Mongolia; on the east by the Sifan and Sechuen provinces of China, and on the South by the Himalaya, from the point at which it is pierced by the Burampootur on the east, to the meridian of the Mansarowur and Rawan Rud Lakes on the west. The general direction of the Kangtisee range is north and south, and it is said to connect the Himalaya and Mongolia, as by a cross-bar. It runs to the east of the Mansarowur Rawan Rud Lakes, its highest point is said to exceed in elevation any portion of the Himalaya, and four large rivers have their sources in different parts of the range, viz, the Singh Khawab or Indus, the Langehoo Khawab which runs through Ladak, the Marchace Khawab which is known as the Gogra, and the Tamchoo Khawab or Yaroo, the great river of Eastern Thibet.

*Government of Thibet.* In the city of Lassa, and over the whole of Thibet "Geawa Remboochi" or the "Grand Lama" is nominally the supreme authority, in temporal and spiritual affairs. His residence is in Patala Goompa which is on the north side of Lassa. M. Huc says, that "Lassa" in the Thibetan language means, "Land of spirits." The Mongolians on the same authority call this city "Monche-dhot," i. e. Eternal sanctuary. My friend Cheboo Lama gives the following interpretation, "L'ha" means God, "Sa" abode or resting place. Hence it is the city of God, or the Eternal city.

There are two Resident Envoys from China called "Ampas" stationed at Lassa; subordinate to them are two great officers—Chinese, designated Daloo-he: their rank and occupation are those of general officers. Next to these are two Phopuns who act as Paymasters of the Troops, and perform the duties of our Adjutant and Quarter Master Generals. They are also Chinese. One of the Daloo-hes, and one of the Phopuns are generally stationed at Digarchi. These officers constitute the general staff of the army in Thibet. Next in rank are three Chonghars. They are Chinese, and Military Commanders; one is generally stationed at Digarchi and another at Tingri near the Nepal Frontier of Thibet. Below these are three Tingpuns, non-commissioned officers—also Chinese. There are no other Chinese military officers in Thibet. The usual number of Chinese Troops, all Mantchoo Tartars, in Thibet, does not exceed 4,000 men. Stationed at Lassa 2,000, Digarchi 1,000, Giangtechi 500, Tingri 500.

The above shews that the Chinese functionaries in Thibet are Political and Military Officers only.

All the Civil appointments are held by Thibetans. The local temporal Government of Thibet is headed by the Grand Lama entirely guided in all Political and Military affairs and mainly so



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in Civil affairs by the Chinese Ampas and the Emperor of China.

The first officer is the Chemeling, the second Kandooling, the third Tengeling; they are all Thibetans and the Chief Lamas—Awataris—of Goompas bearing those names. The Principal Goompas at Lassa and its vicinity, are the Genden Goompa..... 3,500 Lamas resident and itinerary.

Leea.....	5,500	„
Depoong.....	7,500	„
Gentoo.....	500	„
Grume.....	500	„
Chenamge.....	1,000	„
Chalang.....		
Chemchung.....	200	„
Kandooling.....	200	„
Tengelling.....	200	„
Chechooling.....	300	„
Monjida Taeling.....	1,000	„

From the three Lama Counsellors, the emperor of China nominates the Noume-hen, "Nome Khan" of M. Huc, who may be called President of the Council, or Prime minister. Gealchup Noume-hen is the proper title which being translated is "the image of Geawa" or the Grand Lama. He is Regent when the Grand Lama is a minor, and at all other times is the alter et idem of his holiness. The Noume-hen is always one of the three Great Lamas above named. At his death, or removal from office, he is succeeded in the Noume-hen's office by one of the two remaining counsellors, always however under orders of the emperor. His successor must, as in the case of a "Grand Lama" be an awatar, i. e. he must re-appear in the flesh as a child, and be raised to that position.

Of equal rank with the Noume-hen but having no temporal authority, is the Genden Tapa Lama, he is next to the Grand Lama himself the highest clerical authority. He is finally appointed by the emperor, being in the first instance chosen on account of his superior attainments and sanctity by the local authorities. He is chief of the great monastery of Genden. The persons privileged to take a part in the selection and recommendation of the Genden Tapa, for his holy office, are the Noume-hen, the two Ampas and the four Shapees. They propose him for election to the Grand Lama, after his approval, the Ampas procure his appointment from the emperor. The Genden Tapa, is chief Lama of a Goompa, but not an awatari Lama.

Next in rank and power to the Noume-hen are the four Shapees. They are not Lamas, always Thibetans and the principal executive officers of the Government in the Financial, Revenue and Judicial Departments. These departments are not separated and under distinct officers. The Shapees are the highest Judicial officers in the Civil and Criminal Courts. Next to the Genden

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Tapa is the "Lama Yeungjing" the private guru, or high priest of the "Grand Lama." He is also appointed by orders of the emperor, and is sometimes an awatari Lama, but not always. His office is to teach and train the Grand Lama in childhood and youth, and lead him, if he can, afterwards. This is indeed an important personage in the Bhuddhist world, being no less than the keeper of the Grand Lama's conscience. The nomination to this post being in the hands of the emperor, furnishes an interesting clue to the extent of the imperial power over the church of Thibet.

The Che Kap Kempu Lama is a churchman of great influence in the Government. He appears to represent the Grand Lama in the council of state and in the deliberations of the Shapees. He may be called Secretary or Minister for the church, and the Shapees may, correctly enough, be called the Financial, Judicial, Revenue and Home Secretaries, or ministers.

The Treasury is managed by two officers named Jhassas; both are Lamas, and act conjointly, although one of them is Treasurer on behalf of the "Grand Lama," and the other on behalf of the Noume-hen or temporal estate. They are assisted by two Sub Treasurers styled Shangjotes. Four officers designated Da-puns are the commanders of the Thibetan Troops, and act as Civil and Political Commissioners on occasions of frontier or other disturbances, they are Thibetans, and not Lamas. The ordinary course of official promotion is from a Da-pun to a Shapee; of equal rank, to the Da-puns is the Che-pun who is however a Civil officer and acts in all Departments as Deputy to the Shapee. Shate Shapee was the energetic Commander-in-Chief of the Thibetan army which opposed the Nepalese under Jung Bahadoor. The Shapee, is often employed as Commissioner on Deputations in Civil affairs either Judicial or Fiscal, and all the cases sent up by the Police for trial before the Shapees are forwarded through this officer. All appointments to the offices above noted, require the confirmation of the emperor.

1. *Tinkpun*—Superintendent of Police and Jails.

2. *Sherpankpa*—Assessors to the superintendent and to act as checks on his proceedings.

3. *Boopun*—Military officers subordinate to the Da-puns but also employed in Civil affairs when required.

4. *Jongpuns*—Collectors of Revenue and Magistrates in the interior. They hold office generally for three years only. They are all laymen, one of these officers who is employed in the district of Gar known, to us as Gartope, is named the Garpun. He has charge of the salt and gold-diggings in that direction both of which are valuable. In the Kampa country to the East of Lassa, these officers are styled Markam tois.

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5. *Giapuns*.—Subordinate Military Officers, non-commissioned.

6. *Dingpuns*.—Ditto, ditto.

7. *Choopun*.—Ditto, ditto, privates are called Ma Mi, which means "fighting men."

The patronage of these seven classes of officers nominally lies with the Gealchup Noume-hen, but the Chinese Ampas have a veto if they desire to exercise it, and the working of the system is to procure the approval of these high officers to the appointments before they are made.

One of the Ampas annually visits the Nepa and Ladakh frontiers. [Note. In 1846, Keshen was the only Ampa or representative of the Emperor in Thibet, but he was one of the eight Tongtongs of the Empire and specially deputed to arrange Thibet affairs at that time and the usual system of two Ampas was then suspended. The following anecdote of Keshen is very characteristic of the self-deceiving system of the Emperor's Government. When Keshen was ordered to be executed for having sold the interests of his country to the English during the War, his life was spared at the entreaty of "Sac Lama" the friend of the Emperor "Taokwong" and sentence of banishment in chains was substituted. Subsequently at the urgency of the same Lama, Keshen was appointed viceroy to Thibet. Affairs at Lassa, and throughout Thibet were in great confusion at the time; three Grand Lamas had died by poison in a few years and the Noume-hen was suspected of the crime. Keshen had the opportunity given him of redeeming his fame; and he did so by re-establishing order in the country, and convicting the Noume-hen. It is a curious fact, however, that he proceeded from his banishment in Manchouria to his Government at Lassa *in chains*, that is to say, he wore a gold chain, the badge of punishment round his neck, concealed by his garments, nor was it removed, and his forgiveness complete until after he quitted Lassa as Governor of Sechmen.] The Noume-hen and the four Shapees have the entire control of the land assessment, commerce, customs and other sources of revenue, and, I believe, that no account of the revenues, or the disbursements of Thibet are required by the Emperor. The Chinese Troops and all the Chinese officers in Thibet are paid by China and in money; the Thibetan Troops by assignments of the Government share of the land tax. There is no money Revenue sent to Pekin, an annual embassy with presents only in cloths, images, books, incense, &c.

There is a fund in Patala Goompa to which 100,000 rupees is added annually. Never opened except in time of great war expenses, it was opened to repel Zorawar Singh the Sikh General, who invaded Thibet from Cashmere in 1842. The Ampas pay is 140 Rupees per day, and

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from China, and he has lands and other emoluments from the Grand Lama.

*Army*. They have no Artillery in Thibet; the Cavalry so called is mounted on ponies; the principal troops are Infantry and great pains are taken to make them good marksmen. Prizes and promotions are the invaluable rewards of good marksmen. The Chinese or Tartar troops are kept quite distinct from the Thibetan ones, which are only a Militia called out when required, and not regularly paid. The Imperial Troops quartered in Thibet do not exceed 4,000 men, and the Thibetan force is not so strong. There are 2,000 Imperials at Lassa, 1,000 at Digarchi, 500 at Giangtchi, and detachments at Phari, and Tingri. The last named post, is on the high road from Cathmandu to Lassa, and is situated on a plateau called the "Tingri Maydan" by the Nepalese. The Imperial troops are armed with long matchlocks, to which a rest is attached. The Thibetans have very few firearms, being provided with bows and arrows, and short swords. The powder is of a very inferior description, and it does not appear that the troops are ever practised in military manœuvres.

### *Personal Habits, Customs and Ceremonies of Thibetans.*

The Thibetans of the higher class wear Chinese satins in the warmer seasons, and the same lined with fur in the cold; all others, male and female, wear woollens in the warm, furs and sheep skins in the cold weather, and never go about without boots. The men do not go about armed. The common people never wash during the cold season; very sparingly at other times. The reason given for this being that the skin of the face cracks and ulcerates from the cold, if water is applied to it. The people of towns, who do not go much outside the house, wash occasionally, but the universal prejudice is strong against ablutions of the person, and it is equally extended to their clothing which is worn in a filthy and greasy state.

Soap is high priced and little used in Thibet; it is not manufactured there. The supply is from India, through the Cashmere traders via Ladakh, and from Nepal. A small quantity also goes from Bengal through Bootan and Sikim. There is a grass in the country or a plant like grass, the root of which pounded with water, makes a lather and is used for washing clothes.

Travelling in the winter and indeed generally is performed on yaks. The women ride astride on them like the men, and they are so masculine and dressed so much alike that it is difficult to distinguish between them.

A Thibetan village or town is never surrounded with filth, as in India. To every house there is a privy, and the contents are carefully preserved for manure. In some situations, where the soil is suitable, saltpetre is made from the



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of this article, which is used for making gunpowder only, goes from India. [Note. At the time of the Sikh General, Zorawur Singh's disastrous incursion from Ladakh into Thibet as far as Gartope, 1842, there was a good deal of saltpetre taken into Thibet through Sikim, also sulphur and lead bullets.] In towns, the contents of the privies are sold annually, and those of people of wealth sell highest.

It is well known that the dead are not burned or buried in Thibet, but exposed on high places to be devoured by vultures. For this business there is a class of men who make it their sole vocation. They are called "Raga Tongden;" they are a low race held in dislike and shunned, but they are generally rich; they go about to the living, begging and extorting money. When refused or ill-treated, they retaliate with abuse which is often successful. "Very good," say they, "you won't give us alms now, you will come into our hands some day, and we will put a rope round your neck, drag your body through the streets, and throw it to the dogs," and the latter part is the frequent fate of the poor man's body, as these men keep numerous dogs to devour the bodies.

The bodies of the wealthy are carefully disposed of; they are carried in a litter to the top of a hill, set apart for the purpose, the flesh cut in pieces, the skull and bones pounded in a mortar, and when all is ready a smoke is raised to attract the vultures, who collect in thousands to eat it up.

The Chinese have spacious burial grounds at Lassa, and Digarchi, and there, as in their own country and wherever they reside, they are well cared for and ornamented. The Lassa one is said to contain 1,00,000 tombs. In the time of Wangh, a celebrated Raja of Lassa, there was an insurrection against the Chinese which ended for the time in the annihilation of the whole army, and the massacre, by the Thibetans, of the whole Chinese population. The funerals of the Chinese at that time were estimated at 4,000. This massacre was punished by the Emperor with signal vengeance, and since that time the Chinese supremacy has been finally established all over Thibet. There was a petty insurrection in 1843, in which many Chinese were killed.

*Religious Festivals.* There are twelve great annual Festivals, viz. Bunteung, Kansupecha, Chushupecha, Gesupecha, Nesupecha, Gosungpecha, Gyajeepecha, Lallupecha, Chindupecha, Dudupecha, Kagyurpecha, Lukphopecha, Pecha is equivalent to Puja.

On the anniversary of the death of a Chief Lama of a Goompa, there is a great festival and illumination. At Tashi Lumbu, three such are held annually.

The "Lassea Moran" festival of M. Huc is

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the anniversary of the first proclamation of the religion of Boodha by Sakya, at Lassa.

*Seasons.* The year is divided into four seasons. First Chid, or early Spring, February, March and April. Second Teuh, or Spring proper, May, June and July. Third Yirrh, or Rains, August, September and October. Fourth Gunh, or Winter, November, December and January. Some showers and southerly winds occur in Chid. In Teuh, it is temperate and dry, but showers, thunder and lightning occasionally prevail. In 1845, a great earthquake was experienced in the Province of Kham north-east of Lassa. It was most severe in the district of the Dirgi Raja. About 3,000 men were killed, and a Goomba destroyed by the opening of the earth.

About 20 years ago, the district of Kompo in the Province of Kham was visited by a severe shock; one village was destroyed by the opening of the ground. During Yirrh, there is constant but not heavy rain and hail in September and October. Frost begins early in November and increases all through the winter. Heavy falls of snow are rare except on the mountains.

*Soils.* Only three kinds of soil are recognized; a blackish one, a reddish one which is described as rather clayey, and a greyish coloured one, which is also clayey and contains a good deal of sand. The last is found along the beds of streams and yields good crops. The reddish soil is also fertile; it frequently contains gravel and stones; it is the prevailing soil in the tract called Dingcham, which extends along the northern face of the great Himalayan chain from Tamang to Keroong, but this region is quite barren. Mean elevation 16,000 feet at least. The blackish soil most abounds in the districts or provinces of Wand Chang; it is the most fertile of all, but also contains stones and gravel.

The fertility of the culturable soil is highly spoken of, and 40 to 50 fold in wheat is considered the average. Crops are generally very certain, and blights or other accidents rare. Early frost sometimes overtakes the harvest and spoils the grain, when the grass is at the same time burnt up, and this causes scarcity and famine. It is then the granaries are opened, and the corn-merchants make their fortunes. There is no interference with the price of grain. It is always dear compared with India, but varies considerably; and the principal cause of scarcity appears to be the early setting in of frost. This is said to be induced by continued clear nights which are greatly dreaded in harvest time.

*Agriculture.* Wheat, barley and other crops sowed in April and May are reaped in September and October; all are irrigated. The peach ripens at Lassa in October and November. It is sun-dried and preserved. No grapes are grown at Lassa. The whole supply of raisins is re-

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old cultivations : yaks, bullocks and ponies occasionally are trained to it. The plough is the same as the Indian one, made entirely of wood, except the stock which is pointed with iron. Timber for ploughs is imported from Sikim and Nepal. Rhododendron Hodgsoni, and birch-wood make the best ploughs. Cultivation in fresh lands is done with the hoe. The Thibetans do not use a harrow, the grain being covered in with the hand.

Barley in Thibet takes the place of potatoes in Ireland; four-fifths of the population live on it.

Neither wheat, barley nor peas will come to maturity as a paying crop in any part of Thibet without irrigation, and the water flooding of the fields, by which they derive a fertilizing effect from the frost, is equally necessary to prepare the soil for these crops. Wheat requires three or four irrigations or waterings from the time the seed is sown till the ear bursts, after which it will ripen without further watering. The flooding of the lands in winter, and watering of the crops in summer are principally effected from drains or canals cut from the rivers : very little watering is performed from wells. The whole of the arable lands along the Painom river and the most of it on the Yaroo Sanpoo are terraced and have maintaining walls of stone raised a little above the surface of the fields. Great pains are taken for the equable distribution of the water by running it off from terrace to terrace, and it is applied from leather bags when it cannot be brought to run on particular spots. Watering freely is indispensable to all crops in Thibet. The atmosphere is so dry and the soil so destitute of moisture, that without it the sun burns up the crop before it comes to ear. In a land of so little rain and with an atmosphere so dry and sun so scorching as to render irrigation and free watering indispensable, the questions which naturally arise are, what extent of area can be watered from the rivers by canals and drains? and is there more arable land in Thibet, than admits of being irrigated from the rivers?

To answer the first question, it would be best to refer to the statistics of the Nile irrigation, in illustration of the extent to which land on either side of a river may be irrigated by artificial means, not by the overflowing of its banks which is not usual by the Yaroo of Thibet, and is therefore not to be taken into the comparison. I have not the means of making this comparison. But to reply to the second question I have taken much pains to collect facts, the most prominent of which are as follow :—

1st. The culturable land on either bank of the Painom river, from its source to Digarchi, has not a maximum breadth anywhere of more than four miles, i.e. eight miles in all for the extreme breadth. In many places however, the river is

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Yaroo one day's sail, the culturable land on either side the Yaroo varies from two to four miles.

3rd. From Giangtchi till the Yaroo escapes from the Kambola range, its course is exceedingly tortuous, generally through great mountains, and it has but a very narrow bed of culturable land in a few places. It is closely pressed in by great mountain ranges in the Kambola district, and elsewhere in this portion.

4th. I allow the utmost extent of culturable land ever given to me by an informant for the Yaroo valley from the point at which it leaves the Kambola range entirely to the junction of the Kechoo or Lassa river; and that is a total breadth both banks included varying from 20 to 40 miles. There is more flat land on the South than on North bank of the Yaroo.

5th. The Kechoo river is closely hemmed in by mountains on the Eastern bank; on the Western bank it has a belt of about four miles of culturable land only.

These particulars will afford some assistance for reckoning the culturable area of the finest part of Eastern Thibet, and will shew it to be very small indeed, compared with the total area of this rugged country, and it is universally asserted that the land is every where dependent on river irrigation for its fertility. On this subject M. Huc says "Paulon, fine purple cloth, scented sticks and wooden bowls are the only good manufactures, neither is their agricultural produce remarkable. Thibet, being almost all covered with mountains and intersected by impetuous torrents furnishes its inhabitants with but little soil suited for cultivation, the valleys alone can be sowed with any prospect of reaping a harvest." When the Yaroo does overflow its banks, the sediment it leaves, is fertilizing. The Yaroo soil deposit is generally light and sandy.

Three feet of digging brings you to the water at Digarchi which stands in the flat and low Delta of the Painom and Yaroo rivers, 20 feet is required at Kambajong. Kambajong is a Police Station in Dingcham. See Hooker's Himalayan Journal and Map.

Many Thibetans believe that the Painom rises in Sikim, but its sources are no doubt, as given by Turner, in the vicinity of the Ramchoo Lakes, north of Phari. A horse Dak is four days from Digarchi to Lassa, a boat by the Yaroo takes 12 days to the disembarking place, nearest to Lassa. It is 12 days' journey to the salt Lakes from Digarchi, due north.

*Crops, Rotation of, &c.* The number of crops is very limited; wheat, barley, buckwheat, peas, turnips and a little mustard, comprise the whole. There is no regular rotation observed. As in India with all crops, so it is in Thibet. Wheat is grown for generations in the same ground var-



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about three times as much barley being grown as wheat. All the Suttoo eaten with tea is roasted barley, and this may be considered as the staple article of food for all travellers. See M. Huc, *passim*.

At Digarchi, Giangtchi and generally in the Province of Chang or Tsang, grain is more plentiful than in the neighbouring province of U; in the former 10 to 15 seers, (20 to 30 lbs.) of wheaten flour per Company's Rupee is reckoned cheap, and in the latter about half the quantity is so.

The dung of animals is so much in request for fuel, that scarcely any is used for manure, nor is there any spare fodder or other vegetable matter available for composts. Human ordure and ashes are therefore the principal manures in use; both are carefully preserved, and very valuable. In the towns the contents of public privies are a source of revenue to the Government, and lodging-houses have privies attached to them which are most jealously watched. The contents of these places are removed by a class of people who principally live by the occupation, and are the filthiest of all the population, which is everywhere and in every grade, very dirty. They work with their hands at their vile occupation and in the middle of it unwashed may be seen drinking hot tea, and eating raw and sundried flesh close to the piles of ordure. Ashes are mixed with the ordure, and this is reckoned the best of all manures. Liquid manure, (ordure with water,) is also in use, but sparingly. This mode of using manure is probably taken from the Chinese.

Scarcely any weeding is required, as the crops grow nearly free of all weeds. When necessary, it is done with the hand, the weeds being carefully preserved for the cattle.

The Thibetans reap with an untoothed sickle, the crops being all cut close to the ground to save the fodder. Wheat is tied up in small sheaves and stocked on the ground, or in yards near the houses. The corn is beaten out by the flail as in Europe, the women taking a part in the threshing with the men. This is done with great care, so that not a grain is lost. There is also a kind of hackle used for beating out the corn. A beam eight or ten feet long toothed with iron spikes, through which the sheaves are drawn. The winnowing is performed in the open air.

The grain is ground into meal by watermills. In some villages, mills are built by subscription, and the parties use them in turn. There are public mills also. The millers in these take one part in 20 as payment. There is a great press at the mills for two months after the harvest, when they are going day and night, as frost sets in November so hard that they cannot be used again till the spring. There are no windmills in Thibet I believe, although in no country in the

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World, I believe, is there a more steady wind in the cold season, than here.

*Wages of Labour.* A Chinese soldier is very highly paid in Thibet, i.e. he gets as much as 12 to 16 Company's Rupees per mensem. The Thibetan soldier has no regular money pay. He is allowed the Government share of revenue on a portion of land, his own farm or another, and this does not exceed 40 or 50 Company's Rupees per annum.

Masons, carpenters and other artificers can earn from eight as. to one Rupee a day in the towns; common labourers three and two annas. Gold and silver smiths are highly paid, eight as. in the rupee for fine work is the usual rate.

*Breads, &c.* The bread is all unleavened, and cooked on heated stones or gridirons. The poorer people make their bread with coarse wheaten flour and water, the better classes with fine flour and butter. The latter description I have eaten. It is a sort of heavy biscuit, made in a long twisted loaf-like shape. The sweet and pure farinaceous taste of the fine flour of Thibet equals the best Cape or American flour. Rice is only eaten in Thibet by the Chinese, and the richer Bhotias. The whole supply is received from Bootan and Sikim. The Thibetans do not cook and eat it plain as the Indians and Chinese do, but make it up into large balls with butter and sugar using it as a pudding and sweetmeat. The staple food of the country is "Champa," called Suttoo in India; it is finely ground flour of toasted barley. It is universally eaten and without additional cooking, and is excellently suited to the people of a country which is so ill-supplied with fuel. Mixed up with hot tea and formed into solid balls, it is called "Paak." Prepared with lukewarm water, it is called Seu. Travellers often carry the "Paak" ready made in skins, and eat it as they go along, but if it is possible to get fuel, they prefer making a jorum of tea, and having the paak warm and fresh. The Thibetans are great eaters when they are in plenty. Tea is drunk at all houses, and at every meal, and is regularly used four times a day, i.e. in the morning early, about 8 A. M., at noon, and in the evening. For breakfast which is always eaten at daylight and before washing of hands, face or mouth, the favourite dish is Tookpa, a sort of broth, made with mutton or yak's flesh, Champa, dry curds, butter, salt and turnips. This is eaten without bread, and followed by a cup of scalding tea. They never drink tea when it is the least cold, and if a foreigner allows his cup to cool and then drinks it, he is considered a very careless fellow. An attendant is always on the watch when tea is being served, and as you proceed, he replenishes your cup with a ladle or from the hot teapot until you cry "Hold, enough," or empty out your cup, and put it in the breast of your cloak, the usual receptacle of many necessaries to a Bhotia. The snuff bottle, thick

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woollen nose cloth, tea cup, bits of dried flesh, &c., are all huddled here, without remorse, and it is a most filthy receptacle.

*Salts, Minerals, Metals, &c.*

1st. *Pen*, a carbonate of soda, is found all over Dingham and Thibet, south of the Yaroo; it appears as a whitish powder on the surface of the soil, never in masses under ground. It is not used to make soap or otherwise in the arts, a small quantity is always put into the water with tea; it is considered to improve the flavour, and it gives a high brown colour to the decoction. It is generally used in medicine.

2nd. *Chulla*, Borax. I cannot learn that borax is produced in any part of Thibet south of the Yaroo river. The general direction of the Yaroo is easterly. It is largely imported into Digarchi, whence it is distributed to other parts of Thibet and to India via Nipal, Sikim and Bootan, whence it finds its way to Calcutta and Europe.

3rd. *Sicha*, Saltpetre, is produced generally in Thibet and manufactured at the large sheep-folds where composts of sheep's dung and earth are formed to produce it.

4th. *Moghée*, Sulphur, is not found in Thibet. India exports this article for consumption at Lassa where gunpowder of good quality is made. The charcoal of the poplar (*changma*), and of the willow (*langma*), are considered the best for gunpowder, and this is fortunate, as these two trees alone attain to any magnitude near Lassa.

5th. *Lencha*, common Salt. Three sorts are known in commerce.

1. *Sercha*—White and best.
2. *Chàma*—Reddish and good.
3. *Pencha*—Yellowish and bad, contains soda or magnesia and earthy matter.

All the salt consumed in eastern Thibet is the produce of lakes or mines situated to the north of the Yaroo river, or comes from "Lache", a district lying between Digarchi and Ladak, which is traversed by the Yaroo. The best information procurable is to the effect that all the salt of Thibet is the produce of lakes; still there are people who assert that it is also dug out of the ground. Possibly this is confined to the vicinity of the lakes or to their dried margins. All travellers in Thibet are agreed that the salt-producing districts are the most rugged and inaccessible that can be imagined. It is quite true that men and sheep only can reach the salt deposits. It is also true that the elevation of the deposits prevents their being worked, except for the warmer half of the year, April to November. Thousands of sheep are employed in carrying the salt from the deposits to places accessible to yaks. These latter animals carry it all over Thibet in loads up to 160 lbs. Sheep in open places will carry 20 to 24 lbs.: in the vicinity of the deposits the ruggedness is so great

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that eight to ten lbs. is as much as can be safely put upon them.

Snow falls annually after November in the Salt-producing tracts and covers the ground for two months or more. The elevation of these places cannot, I believe, be under 22,000 feet.

At Digarchi, 1st quality, 2 Rs. per maund, or 20 lbs. for 1 shilling.

At Giangtchi, 20 per cent, dearer. At Lassa, 5 Rupees per maund, or 8 lbs. for 1 shilling.

These prices indicate the relative distances of the places named from the salt districts. There are no available means of ascertaining the actual distances. Digarchi, the nearest mart, may be twenty days' journey on horseback from the nearest salt lakes. See annexed Route No. 1 of 55 marches for loaded men. (p. 334.)

It is believed that salt is now in course of being deposited in a lake at Tiuke in Dingham—near one of the sources of the Arun river, but it is not worked, and great pains are taken to conceal the fact, as there is a prophecy that whenever salt shall be found in the lakes of Dingham, the glories of Thibet shall be on the wane; which means that a rush shall be made from all sides for the salt which will render the exclusion of strangers ineffectual. Salt is given to sheep and cattle in Thibet, but not to horses.

6th. *Doh so*, in the Thibetan language means "stone charcoal." Coal is nowhere found in Thibet. It is known in that country as a produce of China which is seen at Siling, and other marts on the Thibetan confines of China.

7th. *Ser*, Gold; is found in the sands of a feeder of the Yaroo which joins it on the northern bank. The name of this river is not known to me, but it flows from a country called "Shapduk" and falls into the Yaroo to the west of Digarchi. The greater part of the gold of Thibet is the produce of mines or diggings. See Route No. 2 from Digarchi annexed (p. 834.) The Yaroo itself does not yield any gold-washings. There are no mines of iron, silver, copper, quicksilver or lead in Thibet. All these metals, and their oxides are imported from China.

8th. The yellow Arsenic of commerce is found at Teloongchurfoo, near the borders of China to the North and West of Lassa; it is called Pabea.

9th. *Peu-she*, Amber. The Thibetans always wear large opaque amber-like beads in their necklaces; but the substance is not a produce of their own country, nor is it amber; it is, I believe, expissated turpentine-gunda feroza, mixed with some hardening material. Friction makes it smell of turpentine. It is brought from Siling and other marts of China.

10th. Turquoise, *Gya yeu*, or China stone.

*Pe yeu*, Thibetan stone.

*Te yeu*, Cashmere stone.

This beautiful stone is greatly prized in Thibet, and every one wears it, real or imitation, in rings, necklaces, earrings and amulet cases. The



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best are very rare, and although found in Thibet, I believe, no one can give an intelligible account of the localities. I do not believe that the turquoise is a natural product of Thibet, and the following story corroborates the opinion.

"A great merchant of Thibet named Chongpo who traded, ages ago, with India and once crossed the seas beyond India, brought the finest real turquoise to his native country. From that time the stone has been known there, and like coined money, it continues to circulate in the country as a medium of exchange." The imitations brought from China are made of common earthen-coloured or other compositions. They are easily detected. Those imported via Cashmere are real stones but not valuable. Their only test of a real stone is to make a fowl swallow it; if real it will pass through unchanged.

*Route to the Salt Mines in Thibet.* Digarchi to Punchooling 3 marches. Direction at Digarchi N. W. across the Yaroo.

Amringjong,.....	4 marches.	Direction, N. W.
To Nackchang,.....	8	do. N. W.
Sang-zang Lhoda,..	6	do. N. W.
Sakojong,.....	7	do. N. W.
To-then,.....	8	do. N. W.
Bomet,.....	3	do. N.
Lon-kurqun,.....	10	do. N.
Tarokchan,.....	2	do. N.
Borgpagege,.....	3	do. N.
To Salt mines,.....	1	do. N.

Being 55 marches for loaded men, each 10 miles, say 550 miles.

*Route to the Gold diggings.* The same from Digarchi as to the Salt mines as far as Sang-zang Lhoda, thence to Kasha 10 marches, N. by W. To Komunk 5 ditto, N.

Two more marches to Gold diggings, N.

These marches are somewhat longer than the former ones, and may be each 12 to 15 miles.

### ANIMALS.

*The Goa*—An antelope.

*Gnow*—The ovis ammon.

*Rigong*—Hare.

*Kiang*—Wild ass.

*Lawa*—Musk deer.

*Shaoo*—A large deer, *Cervus affinis* vel. Wallichii.

*Cheu* or *Chiru*—Antelope Hodgsoni.

*Dong*—The wild yak of Thibet. The fiercest of all known ruminants. It will rarely allow a man to escape alive if it can come up with him. It is generally hunted on horseback, the great aim being to detach one from the herd. It affects open grassy places and goes in large herds. The following is the plan adopted by hunters on foot for killing the "Dong."

Its favourite pasturages are ascertained, and in the midst of these the hunters throw up circular enclosures of stone a few yards apart, the hunter taking up a position in one of them. When a "Dong" is within shot, the hunter

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having fired at him, instantly quits his enclosure for another; for as soon as the animal hears the shot, whether he has been hit or not, he, guided by the smoke of the discharge, rushes furiously on the enclosure, and commences knocking it to pieces. When the hunter gets another shot at him he retires again from his shelter to a fresh enclosure, and so on, till he has killed his game. The ordinary size of the "Dong" is four times that of the domestic yak, it is black all over, having occasionally a white streak in the forehead. The horns of a full grown Bull are said to be three feet long, and the circumference must be immense. The common mode of describing it is to throw out the elbow, bring the fingers to the ribs and point to the circle thus formed as the size of the base. It is used by the grandees of Thibet at marriages and other feasts, when it is filled with strong drink, and handed round to the company. Nothing more commendatory of the host's joviality can be said, than that "he regaled his guest out of the Dong's horn."

The horns so used are finely polished, and mounted with silver, or gold, and precious stones. If I ever succeed in getting one, I shall certainly present it for a "snuff mull" to the Highland Society, as the days of drinking in horns are over with us now.

It is common in Thibetan goompas—(Lamaserais,) to see a stuffed "Dong" standing in front of the image of Mahá Káli at whose shrine the animal is thus figuratively sacrificed; axes and other instruments of sacrifice are ranged around the image. Strange that Buddhists should preserve *this* feature of Hinduism in their places of worship; not more so however than, as Hue describes, that a Lama should nearly go into fits on seeing a louse from his tunic impaled for the microscope, while the whole of his countrymen and co-religionists are among the greatest slaughterers and consumers of butcher's meat in the world.

*Pegoo*—the yak.

*Cow*—small, like the cow of Bengal. Hair long.

*Sauh*—cross between cow and yak.

*Sauh Yak*—produce of cow by yak bull.

*Ba Sauh*—produce of female yak by bull.

These are great milkers, better than yak or cow; tail half cow, half-yak. Females give young with bulls or yaks, best produce with yaks. Elevation of shoulder less than in the yak. Hair long but less so than the yaks.

*Look*—sheep, four principal varieties; 1st, Chang Look, or Northern sheep, very large with fine wool. Flocks of 400 to 1000 tended by one man;—2nd, Sok Look, rare, but greatly prized; it is a doomba or heavy tailed sheep, comes from the province of Sök situated to the east of Lassa; wool not very fine;—3rd, Lho Look, a very small sheep indeed, generally white, some-

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times black is bred principally about Lassa; wool very fine and like the shawl wool;—4th, Changumpo Look; abundant about Geroo and in Dingcham, generally very large. I never saw finer sheep in my life than all these were; white wool very fine and soft. The flesh of all the Thibet sheep is fine grained and good.

*Peu Ra*—Thibet goat, small, hairy, of all colours. Has an under coat of fine wool, similar to the shawl wool, but there is no shawl wool trade from Eastern Thibet to India at present. Flesh pretty good.

*Phak*—pig, two varieties. The Lho Phak or southern pig which is most abundant to the south of Lassa, and is described as similar to the Indian village pig, and the small China pig now abundant in Lassa and other towns: no wild hogs any where in Thibet. The Chinese butchers in Lassa blow their pork and take in the country folks greatly by its fine appearance.

*Chu*—common fowl, generally small in Thibet, and there is no large kind as in Sikim where the fowls are remarkably large.

*Damjha*—ducks. Not eaten by the Thibetans, but greatly prized by the Chinese, for whose use only they are bred near and in Lassa.

*Damjha Cheemoo*—goose. Not eaten by the Thibetans, but much liked by the Chinese.

*Gang Sir, Gung Kur, Chaloong, Toong Toong*—Comprise the numerous wild fowl, swimmers and waders, which migrate from India in March and April, and return in October and November; they are all eaten, but not extensively. There is a sort of prejudice against killing them; but as they all breed on the lakes and rivers of the country and are most numerous, the eggs are found in great quantities, the people who live by gathering and selling these eggs never rob a nest of all its contents, but take about half the eggs. This forbearance arises from the general aversion to taking life which prevails in Thibet and it has its reward as it is supposed that the birds if entirely deprived of their young, would not again return.

*Chungoo*—a wild dog, reddish colour.

*Koong*—the Civet, is brought from China and inhabits the Chinese borders of Thibet. It is mottled rather than striped.

*Sik*—leopard. Thibet or contiguous countries.

*Tagh*—tiger, do. do.

*Somb*—bear. A red and a black species.

*Nehornehu*—a large sheep, or goat, or antelope. I do not know which is found in the very rugged mountains north of the Yaroo river, and in the neighbourhood of the salt mines or lakes. It is four feet high, has very large horns, sloping back, and four feet long, has a tail 15 inches long, is shaggy, and of various colours, sometimes black and red.

No leeches, mosquitoes or peepsas in Thibet; and maggots or flies are never seen there. There are no bees or wasps in Dingcham or Thibet

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proper. In the valley of Choombi, a good deal of fine honey is found, which is exported to Thibet.

The lakes in Thibet are full of fish, one kind only is described, it grows to the weight of 8 lb.; it is named "choolap," it is not well flavoured or delicate. I have sent specimens of it to the Asiatic Society of Calcutta, and by Dr. Hooker to Sir J. Richardson. Enormous quantities are taken by the hand in the winter season; when the lakes are frozen over, a hole is made in the ice to which the fish immediately rush, and are then pulled out by the hand. Salt is not used to preserve fish, they are gutted, split up, the tail put in the mouth and allowed to dry in the open air, they keep in this way for a year. The principal lakes on this side the Yaroo are Yando Yeumtso, Ramchoo, Kala, and Chomotetoong near Dobta.

*Sheep grazing, &c.* The number of sheep in Thibet is extraordinary. The flocks are immense, and a person of no consequence whatever will have 2,000 or 3,000 sheep. The large owners have as many as 7,000. The fleece is taken once a year in May or June. The ewes breed twice a year. The great lambing season is in April and May. The other in October and November, many of the autumn lambs die from the cold, but this is not considered any great loss as the skins are so valuable. A cloak of lamb skins made of fourteen skins is worth 25 Thibet rupees or 10 East India Company's Rupees.

The rams remain with the ewes always, but after the ewes are in young, the rams have a sort of breeching put on. My informant's notion is, that this is done to prevent annoyance to the pregnant ewes, but I suspect that they are kept in this way, until the proper season for letting them to the ewes. The allowance of rams is two or three for every hundred ewes. The males are gelded when quite young or up to a year old, the prices vary from five to seven Thibet Rupees per head, i.e. two to three rupees of ours.

The Government dues on sheep farms is 10 per cent, in kind, every three years, this is in addition to a general tax of one Rupee per door on all houses per annum.

During the summer season, but little fresh meat is used. The Thibetans do not like to boil it, and are not partial to it raw unless it has been dried. In November there is a great slaughtering in the towns, and a wealthy man in the country will kill two hundred sheep at this time for his year's consumption, the animal is butchered, skinned and gutted, and then placed standing on its feet in a free current of air. It becomes in a couple of days quite hard, and white, and is then ready to eat. It is kept in this way for more than a year, and undergoes great vicissitudes of climate without spoiling. I have seen it at Darjeeling in the rains quite dry and hard, and in no way decomposed. When long



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exposed to the wind of Thibet it becomes so dry that it may be rubbed into powder between the hands. In this state it is mixed with water and drunk, and used in various other ways. The Thibetans eat animal food in endless forms, and a large portion of the people eat nothing else.

The livers of the sheep and other animals are similarly dried or frozen and are much prized. To a person unused to the dried meat of Thibet, the liver is represented as peculiarly distasteful; it is bitter, and nearly as hard as a stone.

The fat is simply dried, packed in the stomachs, and thus sent to market or kept for home use.

The skins furnish clothing for the working classes and servants. All classes in Thibet put on furs of some kind at the commencement of the winter. It is not reckoned reputable to kill your own meat, and therefore every hamlet has its professional butcher. In towns it is a great trade from the enormous quantity of meat consumed. Some butchers will have five hundred carcasses dried and ready at their stalls. The trade of a butcher—Shempa—is hereditary and strange to say a despised one.

The horns of animals are not turned to any useful purpose in Thibet. Small houses are built in the suburbs of Lassa with horns and clay mortar. Goats are also reared in considerable flocks, but principally on account of their milk. The flesh of the sheep is infinitely preferred. The milk of yaks, cows, sheep and goats is used alike for making dried curds, and the various preparations of milk used by these people. The milk of mares does not appear to be used at all in Eastern Thibet although ponies are extensively bred there. The number of other cattle renders it unnecessary. Fowls are of a small breed, and are reared with some difficulty. The large fowls of Sikim and Bootan are much prized there. The Thibetans do not care about fowl as an article of diet, and it is only since the period of the Chinese supremacy that fowls, pigs, or fish have been used by them. Even now in the places remote from Chinese posts pork and fowls are not to be had. The Chinese must have pork, eggs, fowls, and around Lassa, Giangtchi, Digarchi and other places and their stations, these are reared for Chinese consumption.

**Diseases.**—In July and August severe fevers are not uncommon. Cholera is not known; dysentery is, and is often violent, sometimes proving fatal in four days. Cough and diseases of the chest are not prevalent.

Ophthalmia is very prevalent and very severe. Itinerant oculists go about the country and are in good repute: they never perform operations, but cure by application of unguents and washes. Three days travelling in the snow without hair-blinds is sure to produce ophthalmia.

Skin diseases are by no means common, although the people are so filthy in their habits.

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The most dreaded and the most fatal of all diseases is the small pox. The people fly the contagion leaving their homes in the most inclement weather. Inoculation is regularly performed annually in the warmer seasons. Two methods are in use, one by incisions on the wrist, the other is effected by inhalation. A plug of cotton which has been impregnated with small-pox virus and dried is introduced into the nose and left there for two or three days, at the end of which time, symptoms of the small-pox appear. This method was introduced from China where it is largely practised. Dropsy is rather a common disease, and is generally fatal in the cool season. There is very little rheumatism in Thibet proper; at Bakehan in Choombi it prevails to a very great extent. There is a malady called the "Laughing disease" which is much dreaded, people die of it. It consists of violent fits of laughing with excruciating pain in the fauces and throat, men and women have it alike and is named "Joontook" in the language of the country. It frequently proves fatal in a few days, but is not accompanied with fever.—*Journ. Asiatic Society of Bengal, No. CCXVIII. No. 3 of 1855.*

In Tibet the cycle of Jupiter Vrihaspati Chakra, is used. Their epoch occurs in 1025 A.D.

(2891) THIBETAN SACRED BOOKS. Mr. Cosma de Koros mentions that in these, three periods of their compilation are expressly stated, first under Sakya (520 to 638 B.C.), then under Asoka, king of Pataliputra, 110 years after the decease of Sakya; lastly by Kanishka upwards of 400 years after Sakya.—*Prin. Indian Antiq. page 40.*

(2892) TIBELEBU, the name of a tree in Canara and Malabar. It is also named Nambo-gum. The wood is close-grained, and very durable for general purposes in house-building; the carpenters use it generally: a strong, durable wood. It may be procured in Malabar and Canara in quantities, from eight to thirty-six inches in diameter, and from twenty to thirty-five feet long.—*Edye, M. and C.*

(2893) TIMMUE, called also *Taizbul* (of which there are two species). This is a Nepaul plant, yielding a berry resembling black pepper in shape and size. The berry consists of a black or two colored seed, contained in a thin shell or pod, which spontaneously opens when the fruit is ripe. The shell is a large, strong, pleasant spice, used for various culinary purposes, and likewise possesses medicinal virtues. — *Smith's Nepaul.*

(2894) TIN.

Tagarum, TAM.	Urzeez, PERS.
Ranga, HINDOUE & DUK.	Calung, MALAY.
Resass, ARAB.	Stannum, LATIN.

(2895) TIN-MINES OF BANKA.

The following is a general enumeration of the

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mines which are at present, or were in former periods, worked.

### I. In the Western Division.

Sungie babi,  
Darat lama,  
Sungie Deyng,  
Do. Teluk Robiya,  
Mendshelang,  
Sungie Reang,  
Andshel,  
Boat,  
Kadur,  
Palangas,  
Tampelang,  
Belo,—At Meng gelam,&c.  
Pait Dulang.  
Rangam,

Environs of Minto.

### II. In the Northern Division.

#### A. Western Peninsula.

In the district of Jebus or Anten.

#### a. Large (or Kolong) mines.

Sungie Yang,	}	Upper furnace dis-
Suntag,		trict.
Sungie-bulak,	}	Lower furnace dis-
Tayman,		trict.
Siam,		

Small (or Kulit) mines, (in both districts.)

Sunho	Sunhowa.
Sunyu,	Soktjoy.
Sunsing,	Tenpo.
Sunwad,	Assun.
Sunwing,	Atshey.

In the district of Klabbet.

#### a. Large mines.

Simbin, Sunnie, Yunhim.

#### b. Small mines.

Nobung,	Tshunlien.
Entshe-aling,	Kayu.
Tshentet,	Lolam.
Tshuntat,	Songkay.

Akkiouw.

In the district of Sungie-bulu.

#### a. Large mines.

Tayu, Hohin.

#### b. Small mines.

Sundie, Hapsun.

In the district of Mampang.

#### a. Large mines.

Sinwad.

#### b. Small mines.

Sinyong.

#### B. Eastern Peninsula.

In the district of Blinyu.

#### a. Large mines.

Towallam, Pandjie.

#### b. Small mines.

Thuwissa (and several others.)

In the district of Lumut.

#### a. Large mines.

Hapsun, Lakuntouw, Keighwad.

#### b. Small mines.

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Kloppo (and several others.)

In the district of Sungie liat.

#### a. Large mines.

1. Sub-division of Ayer-Duren.

Tay-hin.

2. Near the stockade.

Wangin.

#### b. Small mines.

3. Sub-division of Lampur.

Log him, Nihin.

4. Sub-division of Ayer Duren.

Atshin.

5. Sub-division of Robo.

Sungin, Djin-hin.

Soy-gim, Digim.

Tohin, Stin-gim.

6. Sub-division of Rabo-kli.

Kingin, Singin.

7. Near the stockade.

Siak-gin, Atshun.

Sungin, Libo.

Lokgin.

8. Sub-division of Djenjang.

Sungin.

#### 1. Sub-division of Katta.

Nyamli.

District of Marawang.

#### a. Large mines.

Wehing.

Kimsowa.

We proceed to make a few remarks on the mines noted below, of their present condition, productiveness and the number of workmen employed therein, after which we shall point out those situations which offer themselves for new mines.

I. On the Western division: Minto and its neighbourhood was the first part of the Island in which mining was attempted. Soon after the accession of Sultan Mahmud Bahadur-ood-din I. to the throne of Palembang, a large number of Chinese adventurers from this capital, from China, Borneo and the neighbouring islands, opened the ground in every direction, and by an unremitting perseverance and industry, exhausted the richest and most favourably situated spots, after which they directed their attention to new mines, in other districts.

The Malay inhabitants of Minto have participated in the working of the mines and have had severe contentions with the Chinese: according to information of persons engaged in the former works, and communicated by them, about 1000 Ingots (or slabs) might still be obtained annually from the places noted below in the environs of the large mountain. But the Malays are unwilling to undertake the work on the same terms with the Chinese in more productive spots.

The mines of Ràngam have not been regularly worked during the last periods, as the attention of the inhabitants is in a great measure directed to other pursuits, although the mines are not yet



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exhausted. This village consists entirely of Chinese; of 60 male inhabitants, 25 are miners.

The mines of Belo were opened soon after those of Minto

### 2. Small mines.

Jiheng,	Tjungheng,
Beyu,	Samheng,
Hohing,	Samhok,
Suntshiu,	Sunwan,
Bihing,	Kwangya,
Atshiu,	Sinheng or
Sunlie,	Tshengai,

### 3. In the south-east division.

District of Pankal-penang.  
(Here all are small mines.)

Krassak,	Butshak,
Krassak-Ulu,	Tshuntshit,
Bakung-bawa,	Samwey,
Tshapsawun,	Hunseng,
Bankwang,	Tshing-peng,
Henglie,	Tshin,
Kayu-bessie,	Bakung,
Suymouw,	Bulu,
Siema,	Ayer-Udang,
Kwang-tsie,	Gomuru,
Wang-sing,	Pangkul,
Ayer-Mangkok,	Sungie-kurouw.

District of Tirak.

Mines (small) at Tjablang and several other places.

District of Koba.

Koba (and the environs) including Rangouw and Kayu Arro.

District of Poku, and Tubuali.  
Including Nyiry and Ulim.

District of Banko-kutto.

Including Balar, Kabal, Permissang and Selan.

A native of China, Assing, was the first person who introduced a regular mode of mining on Banka. The first mines were worked in the vicinity of the present village in various directions near the southern coast of the island; as the ground was exhausted, the miners gradually retired towards the interior. Two mines are at present worked in this district namely Meng-gelam and Pait Doubang. The former employs 25 miners and is in an improving state, the latter has lately been opened by 13 workmen.

At Palangas 24 Chinese are employed in one considerable mine.

The mines of Tampelang are under no regular discipline at present: they were formerly worked by Chinese and the causes which produced their desertion have been mentioned in the Geographical account. Some tin is annually manufactured by the mountain people; sufficient store of ore is still remaining to encourage the regular mode of mining followed by Chinese. At least 25 miners of this nation might here be profitably employed.

## TIN-MINES OF BANKA.

In the annexed table is estimated the aggregate annual produce of the mines of Rangam, Belo, Palangas and Tampelang, very moderately, at 600 Ingots: and after the mines have been carefully administered some time an increase of this number may be reasonably looked for.

### II. Mines of the northern division.

A. In the western peninsula the mines are dispersed through the districts of Sungie Bulu Mampang, Tenga and Klabbet. The most productive mines in this peninsula are those of Jebus situated in the district of Tenga. They were formerly called the mines of Anten, from the name of the settlement or stockade where the chief resided and whither the product was conveyed. In consequence of the most favourable situation for the intercourse with Palembang the establishment has been removed to Jebus, where a more regular stockade has been constructed.

The miners of Jebus are divided, according to their situation, into those of the Upper and those of the Lower furnace. Of the former, that of Sungie Tango (of the Chinese, Sungie Mentangor of the Natives) is the most important. It employs 42 miners and the ground is very productive. During the last season of smelting (in April &c. 1813), above 200 Ingots were produced from the ore which had been collected in 15 preceding months.

The mine of Suntay employs 25 miners and has produced in the period just mentioned nearly 1000 Ingots. The principal mine of the Lower furnace is at Sungie Balak; here 32 hands are employed, and the ore collected in the same space of time above mentioned was upwards of 1000 Ingots. The mines of Sidm and Taynam, likewise in the district of the Lower furnace, give separately work to 13 miners, but they are conducted with less regularity than the three large mines first enumerated: they are capable of producing if properly administered, collectively, about 1000 Ingots annually.

It may be noted, regarding the mines of this district,

1. That they command a sufficient supply of water from a stream, during the greatest part of the year,

2. That the ground contains, according to all indications, a considerable store of ore, and may be worked for a number of successive years,

3. That a considerable proportion of the miners are married, which has a great effect in fixing them to a particular spot, and making them useful in their profession,

4. That the disposition of the miners is obstinate, highminded and riotous.

In the 10 small mines of this district 29 miners are employed at present: they produce collectively in common periods, 1000 Ingots a year.

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In the district of Kläbbet 2 large and 9 small mines are at present worked : they are all situated in the central part of the western peninsula, within the circumference of a few miles of the Upper-furnace district above mentioned. The first large mine is that of Siuhin : it employs 32 miners and in regard to resources and productiveness resembles the three large mines of the district of Jebus. At a reasonable estimate the annual produce of this mine somewhat exceeds 100 Ingots. The mine of Sannie employs 21 workmen and 500 Ingots at least may annually be expected from it : of the small mines of Blabet, nine in number, several are favourably situated : the aggregate annual produce may at a low rate be calculated at 100 slabs. The large mine of Yunhin is at present neglected in this district. A considerable store of ore is said to be remaining but its depth exceeds that of the other mines, and the extraction of the ore requires, in consequence, an additional expense.

In the district of Sungi-bulu the large mine of Tayu is worked by 28 miners : it is situated near the central mine district of this peninsula, in the neighborhood of the mine of Siam. Besides the two small mines, in which about 7 hands are at work, an attempt has lately been made to open again the neglected mine of Hohin, and a party of workmen has been engaged for this purpose. The aggregate of what may be expected from all these mines, after a liberal calculation, is 1500 Ingots annually, which supposes however, that the attempt of working again the mine of Hohin does not entirely fail, as the two small mines are nearly exhausted.

In the district of Mampang a commencement has lately been made to work several mines. The Kengsy or chief of Belinyu obtained the permission of the Sultan for opening the ground shortly before Banka became a British possession. One of these is a large mine and employs 8 workmen, the other is a small one and is worked by 4. The situation of both, as far as experience has hitherto shewn, is favourable, in regard to the store of ore, and they both command a supply of water : the works have been laid out with judgment, but the settlement labours under the usual disadvantages of new establishments on Banka ; the climate in many situations, especially near the sea, is unwholesome, and the settlement is exposed to the visits of smugglers and pirates. The productiveness of this district will depend in a great degree on the number of miners that can be induced to settle here from other parts of the Island : with those necessary improvements which may soon be expected, this district will yield annually at least 600 Ingots, and a considerable increase will probably follow if the mines are well administered.

In the Eastern peninsula of the northern portion of Banka, the miners are distributed through

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the districts of Belinyu, Lumut, Sugie-liat and Marawang.

The mines of Belinyu were opened soon after those of Belo by a Chinese subject of Palembang named Demang Ko ; and some extensive works were commenced about the same time at Pandjie by a Chinese of the name of Bing ; both were afterwards united and administered by one chief. The only productive mine which is now worked in this district is that of Towallam, it employs 11 miners.

Several small mines have been worked until lately. The mines of this district have for many years been in a declining state. In the year 1805 the average annual produce was 1200 Ingots : this has gradually decreased to about one half of that number. In the mine of Pandjie the labours have been entirely discontinued. In a considerable village established here, 16 miners are remaining, most of whom are married and have directed their attention to other pursuits. They assert that an opportunity remains for opening a new mine a few miles to the eastward of their village.

The present annual produce of Belinyu, rarely exceeds 600 Ingots : what may reasonably be expected from about 30 miners that are now unemployed will be enumerated in the general table.

In the district of Lumut, three large mines are worked, namely Hapsun, Lakuntouw and Keighwad : they are of less extent than the large or Kolong mines of the other districts, and are undertaken by one chief miner, (Kongsy) who engages as many assistants as his works require. The mine of Hapsun employs at present 4 workmen ; that of Lakuntouw 7 and that of Keighwad 5.

The remarks on the declining state of the mines of Belinyu apply equally to this district, and several of the mines formerly worked have been exhausted. According to a statement which was made up from the books of the chief, the annual produce during the last 20 years did on an average not much exceed 400 Ingots.

Through the extensive district of Sungie liat 20 mines are dispersed of which 2 only are large mines : they will generally be enumerated in the table. The mines of this district were first opened by the family of the Chinese Assing above mentioned. His son Demang Dyaya Laxana obtained from the Sultan the privilege of working them about 40 years ago. Since this period the most favourable and productive situations have been successively exhausted and the produce has gradually decreased. The average number of Ingots which may be expected annually from these mines collectively at present is 2600. This calculation supposes that the district of Ieniang, which has been less worked than other parts, is carefully administered, and that a large mine



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lately opened near the stockade will answer the expectations that have been formed of it.

In the district of Marawang 15 mines are worked, of which 2 are large mines. One employs 10 workmen and produces on an average 300 Ingots annually, the other was formerly neglected in consequence of bad management. Thirty miners have lately united to work it again, and have made some progress: the investigations that have been made indicate a store of ore, and the increase of the annual produce of Marawang will depend, in a great measure, on this mine. Of the small mines, 6 are in a favourable state and according to moderate calculation will yield annually 800 Ingots; the others are nearly exhausted or want the necessary supply of water. I have estimated the annual produce of this district at 1500 Ingots.

### III. Mines in the third or south-east division.

In the south east division of the island I have visited only the districts of Pangkal-pinang and Tirak. The former is, next to Jebus and Sungieliat, the most important and productive portion of Banka. It contains at present 18 mines dispersed through the subdivisions of Messu, Bakung, Kayu-Bessie, Ayer maukok and Bangkwang in which 63 miners are employed. Although the districts in which these mines are situated have been worked nearly thirty successive years, they still contain a considerable store of ore. It is supposed by the best informed persons that, with a careful superintendence of the mines and the necessary direction of the labours of the miners the aggregate annual produce will amount agreeably to a moderate computation to 4000 Ingots.

The mines of Tirak were formerly under the superintendence of the chief of Marawang: and have been opened within the last 10 years. They have during several seasons been neglected, but if properly administered the former annual product of 400 Ingots may be expected from them again.

Before I enumerate the districts next in order in this division of the Island which supported mines in former periods, I shall mention Tubuali near the extremity. This district, although it has greatly participated in the common disasters of this part of Banka, (which will be detailed in another place) has not like most others been completely ruined and depopulated. In Tubuali the chief business of mining has hitherto been carried on by the mountain people; but a number of Chinese miners have lately been introduced, a regular mode of mining is attempted, and an increase may soon be expected in its produce. Considerable improvements are however still to be made, and a large additional number of Chinese miners can be employed with advantage. Much of the future produce of the Island must be expected from this and from the neighbouring districts.

## TIN-MINES OF BANKA.

I have estimated the annual produce of Tubuali including Nyiry and Ulim at present, at 1000 Ingots. The latest accounts of the former annual produce do not indeed amount to that number, but as the business has hitherto been carried on very imperfectly by mountain people alone, I have taken into consideration the introduction of the Chinese and the general improvement and extension of the process of mining. The additional quantity (above the 1000 Ingots mentioned) to be expected in future from Tubuali will be stated below.

I proceed next to mention those districts in which from various causes, but principally on account of the attacks and ravages of the pirates, the mines have been entirely neglected or deserted.

At the southern boundary of Pangkal-pinang, we meet with Koba, which was formerly one of the most productive districts of Banka. It supported 22 years ago Chinese miners who worked 15 mines, and produced annually upwards of 3,000 Ingots: It includes the sub-divisions of Rangouw and Kayu-Ano, along the eastern coast of the island, while Pangkul and Sungie Kurouw are generally added to the district of Pangkal-pinang. Paku is situated near the centre of the island in a direction west to Koba: although the inhabitants of this district paid more attention to the preparation of Iron from the ones of the neighbourhood, a small quantity of Tin was also manufactured. In the estimate of what may reasonably be expected from those various mines, I have calculated Koba, including Rangnouw, Kayu-Aro, and Paku in the first periods at 1250 Ingots annually, provided a sufficient number of Chinese miners can be induced or encouraged to settle there and to recommence the working of the mines. More than double that number may be expected in a few years, after the works have been extended according to the opportunities afforded by productive beds for collecting ore.

The district of Banko-kutto takes in the long range of Permissang hills, in the environs of which various mines were formerly worked. These were dispersed through the sub-divisions of Balar, Kabal, Permissang and Selan, in all which a very inconsiderable portion of a formerly extensive population is now remaining. It will therefore require time and care to derive those advantages from them, which they are capable of affording. From the most credible information which I have been able to obtain, I have estimated the annual produce of those districts collectively, provided the necessary miners can be introduced, at 500 Ingots; which number may be expected to increase as the progress of the settlement advances.

In taking a review of the Island of Banka it will appear that most of the larger districts have already supported an establishment; and although the greatest part of the

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is now deserted and waste, it formerly possessed an extensive population and very considerable mines. It is evident therefore any new situation for a mine, will be comprised in, or at least adjoining to, one or other of the districts already enumerated, for the general limits and extent of which I refer to the map.

In my enquiries after favourable spots for new mines in which the original store contained in the earth, might have been exposed to observation or extraction, the following places were particularly pointed out to me :

- |            |                 |
|------------|-----------------|
| 1. Dshebu. | 3. Tengkiya and |
| 2. Mapur.  | 4. Keppu.       |

The river of Dshebu passes several miles to the northward of the stockade of Klabbet; and its neighbourhood, near the confines of the large mining district, is supposed by well informed persons to afford an opportunity for opening a large mine of considerable extent, and in my estimate of an additional produce from the district of Klabbet, as well as of new miners to be introduced, I have taken this into consideration.

In the district of Mapur, included between Lumut in the west, and the northern parts of Sungie liat in the east, an attempt is made at the present period to resume a former attempt which was frustrated by the pirates. A number of Chinese miners have associated for this purpose : the condition of the strata, as far as regards a store of ore is reported to be favourable but the neighbouring country is almost a complete desert, only a small part of the former population of mountain people is remaining, and the settlement will require considerable time to recover. In my calculation I have estimated the produce which will probably be afforded when the works have been properly effected, at 500 Ingots annually, which number may be expected to increase from year to year. But no part of the Island is supposed to contain a richer store of ores than the districts of Tengkiya and Keppu, at the southern extremity of the Island, forming part of the larger district of Tubuali. Keppu is situated on a river of the same name, which discharges itself into the straits of Lipar, and Tengkiya lies not a great distance further east.

As long as Banka was exposed to the perpetual attacks of the pirates, no person ventured to form an establishment in a part so exposed and distant ; but under the present government and administration, the attention is most strongly directed to these two districts : their situation is not distant from Tubuali, and they may be probably superintended by one person.

In making an estimate of the probable produce from Tengkiya and Keppu, I can be guided alone by the information obtained from others. I have procured a statement from several intelligent Malays at Minto, (natives of Palembang) as well as from various Chinese at Pangkal-pinang who were formerly employed in the mines of the

## TIN-MINES OF BANKA.

southern part of the Island, according to which each of these districts will be able to furnish, by the regular process of mining carried on by the Chinese, annually 1,000 Ingots, and a very considerable increase of this number may be expected when the population and an additional number of Chinese miners, admits of a proportionate extension of the mines.

I shall add a few remarks as to an increase of the produce of those districts which now support the principal mines.

Although the mines in the northern division are at present more extensively worked than those of any other part of the Island, they still admit of an increase, which, in the table annexed, I have estimated as follows viz.

In Jebus annually,	... 1200 Ingots
„ Klabbet (including Dshebu.)..	1250 „
„ Sungie bala (taking in a new mine lately attempted towards point Tanjong-Tamudsha)..	250 „

In Mampang (including an additional large mine) 500 Ingots. As to the mines of the eastern peninsula, if new works are undertaken by the miners of Panje, I have calculated an annual increase of the produce of Belinyu of 500 Ingots, while in Marawang a small increase only may be expected, probably not exceeding 250 Ingots.

The mines of Sungie-liat are already worked to their full extent.

In the district of Pangkal-pinang various new mines may advantageously be attempted, while the present works may be extended, particularly in the subdivisions of Bakung, Bulu, Ayer-Udang and Gomuru : the deserted mines of Pangkul and Sungie-Kurouw may also be worked again with favourable prospects ; and in conformity to these opportunities I have formed the estimate of an increase, to the general amount of 2000 Ingots. The number of fresh hands required for these new or additional mines is also included in the general table.

From the statements above detailed, the order of the importance and productiveness of the mining districts of Banka is as follows :

- |                   |                 |
|-------------------|-----------------|
| 1. Jebus          | 5. Marawang.    |
| 2. Pangkal-pinang | 6. Sungie-bulu. |
| 3. Sungie-liat.   | 7. Blinyu.      |
| 4. Klabbet.       | 8. Lumut.       |

I have not included in this statement Mampang, Tabuali and the mines eastward of Minto to Tampelang, as their supplies depend more than in the other cases on accidental circumstances.

It appears from the annexed table, shewing the quantity of Tin produced on an average annually at the present period that the number of Ingots amounts to 21,600 yielding according to the usual mode of estimation 10,800 piculs of 100 Catties Chinese weight or 133½ lbs. Troy each, or 1,440,000, lbs. It would be interesting in various points of view, to trace for a number of ascending years, the annual produce



## TIN-MINES OF BANKA.

of the mines of Banka, but for this purpose, no records are left on the Island, and we have only the verbal accounts and relations of the old inhabitants to supply us information: these are, however, confirmed by the testimony of many respectable persons at Palembang and at Batavia, as well as by various documents which remain at the latter place. They tend to prove that the former produce of Banka exceeds that of the present time in a manifold proportion.

The most prosperous period of the Island both regarding the supplies obtained from the mines and the general condition of the Inhabitants, was during the reign of Sultan Achmad Nadga Mudin I, and some time before his accession to the throne, or between the years 1750 and 1775. Sixty thousand piculs, or 120,000 Ingots, is but a moderate estimate of the aggregate produce of the mines during this period, and by most persons supposed to be competent to afford information on the subject, it is rated much greater.

In the year 1770, May 11th, the Governor and Council at Batavia published the following Resolution:—"Not to accept from Palembang annually, more than 25,000 piculs of Tin: and because this year 5000 piculs above this quantity have been sent here, no more than 20,000 piculs shall, on any account, be accepted the following year: of which timely information shall be sent to the king."

The operation of measures of this kind requires no comment; the clandestine trade to China, which was facilitated by the annual visits of numerous junks and already engrossed at least one half of the produce of the mines, received not only encouragement but sanction, as the only support of the numerous miners occupied on Banka, depended on a ready disposal of the manufactured Tin; and it is adduced at present to afford a testimony of the productiveness of Banka at this time.

Two causes have principally contributed to produce the egregious defection in the annual proceeds of the Island.

1. An actual diminution of the store of ore, the gradual exhaustion of the mines in the neighbourhood of the ancient settlement; and

2. The concurrence of the various disasters which have harassed Banka since the year 1784. The latter will, with more propriety be detailed in another place, on the former I shall add a few remarks.

The period of the discovery of the Tin-mines on Banka is not very remote; it falls within the first 20 years of the last century, and this (as has already been noticed) shortly preceded the settlement of Minto. During the first year of the reign of Sultan Mahmud Badur-Udin I, attracted by the prospect of gain, numerous Chinese miners and adventurers resorted to Banka (as above related,) about this time, and as the stores of ore near the first establishment failed gradually at-

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tempted and removed to other districts, spreading successively through Below, Klabbet, Sungie-liat, Anten or Jebus, Pangkal-pinang, Marawang and Sungie-bulu, selecting the most favourable spots where a rich store of ore combined with a supply of water to facilitate the labours of the miners.

After a lapse of about 30 to 40 years a gradual diminution was observed in many parts of these districts, while others were entirely exhausted and new situations attempted: but still the aggregate annual produce of the Island amounted nearly to the quantity above stated. Since the year 1780, a decrease has become more evident, and after the commencement of the disasters of the Island 30,000 piculs were rarely produced in one year. During the last 15 years the annual quantity has gradually lessened. The constitution of the mines elucidates this diminution in a great degree, the ore is uniformly deposited in horizontal beds at no great distance below the surface. These beds have in some instances been immensely productive; by which the abundant supplies of former times are accounted for, when the number of miners was proportionate to the opportunities afforded of collecting ore. The inquisitive shrewdness of the Chinese directed them to the most profitable spots, and in travelling through the western and the northern division of the Island, one passes extensive surfaces which have been turned up and drained of their contents, exhibiting the remains of former mines and aqueducts.

But, although in the western and in the northern divisions of Banka, the most productive situations have been exhausted, or their store considerably diminished, yet the annual quantities computed as the present produce of the various mines above mentioned (and which are exhibited in the table) may with little variation be expected, as far as my most careful observations have enabled me to judge, and after the establishment of the new mines of Mapur, Dshebu, Mampang, Pandjie, &c., and particularly when the great south-east division is brought into activity and the mines of Koba, Rangow, Kayu-Ano, Tengkiya, Kappa, Selan, Permissang, Banko-kutto &c., contribute their proportion, the full quantity stated in the table may be expected: this according to my personal calculations and enquiries, assisted by the concurrent testimony of well informed persons, must however, be considered as the maximum to be expected from the mines of Banka for the next five years, and probably for a longer period, requiring for its production the advantages of a careful administration.

In the future regulation of the affairs of Banka it will become an object of primary policy and interest to investigate experimentally those tracts which have in a great measure remained untouched, in order, as the beds near the present establishments are exhausted, to remove them to

## TODAH.

to new situations in those districts which contain a larger store of ore.

To these remarks, I shall only add a few documents which were afforded me by the books of the Kongsies (or chiefs of the mines) as to the annual produce in the following districts for a small number of successive years.

### *The mines of Jebus produced.*

In the year 1806	Ingots 4,542	In the year 1809	" 5,642
" " 1807	" 6,217	" " 1810	" 6,874
" " 1808	" 6,106	" " 1811	" 5,445

### *The mines of Klabbet produced :*

In the year 1805	Ingots 6,193	In the year 1809	" 4,762
" " 1806	" 4,967	" " 1810	" 4,034
" " 1807	" 4,784	" " 1811	" 2,601
" " 1808	" 5,478		

### *The mines of Sungie-bulu produced :*

In the year 1799	Ingots 1,503	In the year 1806	" 4,659
" " 1800	" 4,643	" " 1807	" 2,395
" " 1801	" 3,606	" " 1808	" 5,169
" " 1802	" 4,400	" " 1809	" 3,817
" " 1803	" 3,402	" " 1810	" 1,999
" " 1804	" 4,968	" " 1811	" 981
" " 1805	" 6,595	" " 1812	" 1,057

### *The mines of Belinyu produced :*

In the year 1805	Ingots 1,247	In the year 1809	" 753
" " 1806	" 1,182	" " 1810	" 581
" " 1807	" 931	" " 1811	" 624
" " 1808	" 644		

### *The mines of Lumut produced :*

In the year 1794	Ingots 400	" " 1804	" 400
" " 1795	" 400	" " 1805	" 410
" " 1796	" 390	" " 1806	" 412
" " 1797	" 355	" " 1807	" 420
" " 1798	" 400	" " 1808	" 410
" " 1799	" 400	" " 1809	" 400
" " 1800	" 410	" " 1810	" 425
" " 1801	" 402	" " 1811	" 410
" " 1802	" 400	" " 1812	" 400
" " 1803	" 405	" " 1813	" 322

### *The mines of Marawang produced :*

In the year 1799	Ingots 4,300	" " 1806	" 2,389
" " 1800	" 4,590	" " 1807	" 2,439
" " 1801	" 4,623	" " 1808	" 3,145
" " 1802	" 3,701	" " 1809	" 2,349
" " 1803	" 3,353	" " 1810	" 2,339
" " 1804	" 3,309	" " 1811	" 1,395
" " 1805	" 4,062	" " 1812	" 1,491

As to the annexed table, shewing the quantity of Tin produced on Banka, I shall only observe, that most of it is compiled from inquiries on the spot, and from a personal inspection of more of the mines during a journey through the Island, to which has been added whatever information or instruction could be obtained from intelligent natives, and from the books and annotations of the Kongsies or administrators of the mines during the sovereignty of Palembang.—*Horsefield on the Tin of Banca. Journ. of the Ind. Archi Vol. ii. No. XII. December 1848, pages 796 to 809.*

(2896) TODAH, Kotah, Badaga and Kurumbu, are names of aboriginal tribes occupying the Neilgherry hills. The dialects spoken by them differ chiefly in the pronunciation, therefore, the same or nearly the same word in the

## TORTOISES.

month of a Todah, with his pectoral pronunciation, can scarcely be recognized as the same in the month of the Kotahs, with their dental pronunciation. The Badaga and Kurumbu dialects are midway between the former two, with regard to pronunciation. Amongst the several Badaga tribes, those who came at a later period to the hills, the "Kangaru" (Lingaites), for instance, who emigrated from Targuru, speak a purer Canarese than the common Badaga.

The names of the five Todah Tribes are Peikee, which is the chief tribe, Kenna, Pekkan, Kuttan, Todi.

They are idle, dirty, intemperate and unchaste. Polyandry has always existed among them, and their women are now addicted to general prostitution with men of other races.—*Page 8, Beng. As. Soc. Jour. 1856 and No. 6 of 1838.*

(2897) TODDALIA ACULEATA is a common bush on the Coromandel coast. All the parts are very pungent, especially the roots when fresh cut. The fresh leaves are eaten raw for pains in the bowels; the ripe berries are fully as hot as black pepper, and have nearly the same kind of pungency.

The fresh bark of the root is administered by the Telinga physicians for the cure of the remittent, called Hill fever. Roxburgh conceived that this tree possessed very valuable stimulant properties, and Dr. O'Shaughnessy is of the same opinion, though he does not appear to have ever made any experiment with it. In fact nothing has been added to what Roxburgh knew, although some specimens of the bark were sent to Europe in 1818. Its properties are worthy of further investigation.—*Ind. Ann. Med. Sci. for April 1856. p. 395.*

(2898) TORTOISES. In Southern Asia, are found a very considerable number of fresh water Tortoises. Testudo Greca inhabits a part of Syria, the Test. geometrica, an African species, is found also in the island of Ceylon; but the existence of the Test. Indica in a natural state upon the coast of Coromandel, is not confirmed. Of the known species of Trionyx, several inhabit the rivers of Southern Asia. One has been observed in the Euphrates, which is perhaps identical with the Trionyx of the Nile, also found in Hindustan. The Ganges maintains the Tr. Gangeticus, peculiar, as far as is known, to that river; another, the Tr. granosus, which forms the passage to the Emydes, is found also on the coast of Coromandel; while two others, Tr. stellatus, and subplanus, have been observed from Bengal to the Island of Java. The Trionyx of Japan belongs most probably to the first of these, which would thus be nearly as widely diffused as the E. vulgaris of which a local variety is found in the Islands of that Empire. The other Emydes of the South-eastern portion of Asia are E. Tectum; E. megacephala, so characteristic in its heavy or unwieldy form; E. Te-



## TORTOISESHELL OF CELEBES.

trionyx, intermediate between the Emydes and Trionyx, and a native of the river Irawaddy; E. Spengleri, of which several interesting varieties are known from the isle of France, Ceylon, Penang, Malacca, Sumatra, Java, Borneo, and China; and finally, two species, which vary from the others by their rounded shell, and of which one possesses a moveable sternum; E. couro inhabits China, the southern point of Celebes, and the island of Penang, Java, and Amboyna; while the other, E. trijuga, has only been found in Java. (*Siebold, Faun. Jap. Chelonii per C. J. Temminck, and H. Schlegel*) Magazine of Zoology and Botany V. 1. pp. 199, 200.

### (2899) TORTOISESHELL OF CELEBES.

Amongst the more valuable of the commodities which the enterprising and industrious Bugis annually bring from Celebes and other eastern islands, Tortoiseshell holds one of the first places. The quantity imported into Singapore sometimes rises above 13,000 and sometimes sinks below 7,000 pounds, but the average one year with another is about 10,000 pounds. The following is an account by Mr. Vosmaer of its collection by the Orang Bajo of the south eastern peninsula of Celebes.

The Orang Bajo distinguish four principal kinds of Tortoise, and name them Kulitan, Akung, Boko, and Ratu. The first named is the kind, which on account of its costly shell, is the most prized. It is the so named Karet tortoise. The shell or back of this creature is covered with 13 shields or blades, which lie regularly on each other in the manner of scales, five on the middle of the back and four on the sides; these are the plates which furnish such costly tortoise shell to art. The edge of the scale or of the back is further covered with 25 thin pieces joined to each other, which in commerce are known under the appellation of feet or noses of the tortoise.

The value of the tortoise shell depends on the weight and quality of each head, under which expression is understood the collective tortoiseshell belonging to one and the same animal, which is the article of commerce so much in request both for the Chinese and European markets.

Tortoise-shells which have white and black spots that touch each other, and are as much as possible similar on both sides of the blade, are, in the eyes of the Chinese, much finer, and are on that account more greedily monopolized by them, than those which want this peculiarity and are on the contrary reddish, more damasked than spotted, possess little white, or whose colours, according to their taste, are badly distributed. The caprice of the Chinese makes them sometimes value single heads at unheard of prices, namely such as pass under the name of white heads, which they also distinguish by peculiar names. It is almost impossible to give an accurate description of these kinds, and of their subdivisions, for these depend on many circum-

## TORTOISESHELL OF CELEBES.

stances which remain inappreciable to our eyes. It is therefore enough to remark on this subject that such heads, as, possessing the above named qualities, are very white on the blades and have the outerrim of each blade to the breadth of 2 or 3 fingers wholly white, and the weight of which amounts to  $2\frac{1}{2}$  catties (qualities which are seldom found united) may be valued at one thousand guilders and upwards. The feet of the tortoiseshell are only destined for the Chinese market; whenever the two hinder pieces are sound and have the weight of  $\frac{1}{4}$  catty or thereabouts, which is very seldom the case, they may reach the value of fifty guilders and more. The whole shell of a tortoise seldom weighs more than 3 catties, notwithstanding it is asserted that there sometimes occur heads of 4 and 5 catties. Tortoise shells are also sometimes found, of which the shell, instead of 13 blades, consists of a single undivided blade; the Orang Bajos call this kind, which very seldom occurs, Lojong.

The Akung also furnishes tortoise shell (karet,) but the shell being thin, and of a poor quality, much less value is attached to it.

The Boko is the same as that which is called Panju by the Malays. It is the common sea-tortoise which is of no other use than to be eaten. To these sorts the Panjubui ought to be added, being the common tortoise, with a thick shell, like that of the proper tortoise, but of poor quality and therefore of trifling value; so also the Akung Boko which is distinguished from the common Boko by its much larger head.

The Ratú, lastly, furnishes a sort which is distinguished by its peculiarly great size, the Orang Bajos asserting that it is usually twice as big as the largest tortoise-shell tortoise, and therefore 5 to 6 feet long and even more.

The usual modes by which the Orang Bajos catch the tortoise, are principally by the hadung, the harpoon and the net; to these we add the simplest of all, namely, falling upon the females when they resort to the strand to lay their eggs. This is also the most usual, I may almost say the only way, by which the inhabitants of the coast catch this animal. They need nothing more, than, as soon as they have got the creature in their power, to turn it on its back, when, unable to recover itself it remains lying helpless in their power. It sometimes also falls into the hands of the dwellers on the coast through means of their fishing stakes, into which it enters like the fish, and from which it can find no outlet but remains imprisoned in the innermost chamber.

Whenever the Orang Bajos have caught a tortoise, they kill it immediately, by blows upon the head. They then take its upper shield or the back itself quite off, being the only thing about the animal which has value. The tortoiseshell adhering so fast to the shield that, if they at once pulled it off, there would be danger

## TRIMURTI.

of tearing the shells, they usually wait three days, during which time the soft parts become decomposed and the shells are loosened with little trouble. When they wish to remove the shell immediately after the capture, they separate it by means of boiling water. They also often accomplish this object by the heat of a fire, in the application of which, however, a danger is run of injuring the shell by burning it, for which reason this mode is only adopted by those who do not know its value.—*Journ. of the Ind. Archipel. Vol. III. No. 17. June, 1849.*

One of these Topes at Manikyala, was opened by General Court, and subsequently explored by General Ventura. One exists at Usman Khatir, in the basin of the Indus and another at Peshawur.

(2900) TOPE. Sepulchral mounds, found in various parts of India, in the caves of Keneri or Kanuri; on the Neilgherry Hills &c. Also the term applied in Southern India to groves of trees, generally of mango or tamarind.

(2901) TOWTAL the Malayala name of a tree which grows to about two feet in diameter, and thirty feet high. It is remarkably light but not very durable, and is used by the natives for catamarans, &c.—*Edye. M and C*

(2902) TRIBULUS TERRESTRIS, LIN.  
Neringie keeray, TAM. | Pulleroo koora, TEL.  
Gokoroo ke baujee, DUK. | Soodumstra, SANS.  
*Ainslie's Mat. Med. p. 255.*

(2903) TRICOSANTHES ANGUINA.  
Chichunda, Hind.

(2904) TRICOSANTHES DIOICA.  
Pulwul, HIND. | Fruit edible.

(2905) TRICOSANTHES PALMATA.

(2906) TRIGONELLA FENUM GRÆCUM.

### The Seeds.

Vendeum, TAM.	Halbeh, ARAB.
Methi, GUZ.	Mentooloo, TEL.
Maytie, DUK.	Fenugreek, ENG.
Moohteeh, HIND.	

### The Leaves,

Vendeum Keeray, TAM.	Fenugreek greens, ENG.
Maytic Ke baujee, DUCK.	

*Ainslie's Mat. Med. p. 269 and 257.*

(2907) TRIMURTI. The term employed to designate the Triad of gods of the Hindu mythology, Brahma, Vishnu and Siva. Whose attributes are those of the Creator, the Preserver and the Destroyer. The consorts of Brahma are Saraswati, Sakti or Maya. Of Vishnu, Lakshmi, Padma or Sri, and those of Siva are Parvati, Bhawani or Durga. The attendant Vahan or vehical of Brahma, is a Hansa or goose: that of Vishnu is a Garuda or Bird, and Nandi or the Bull pertains to Siva. Meru is the station of Brahma: the sun that of Vishnu, and Jupiter that of Siva. The Symbols of the three deities

## TYPHA ELEPHANTINA.

are respectively • Time, Water and Fire. Their common titles A. U. M. are for Brahma Parameswara, for Vishnu Narayana, and Mahadeva for Siva. Brahma is worshipped mentally, but Vishnu is worshipped under the figure of the Saligram and the nine Avatars, while the Lingam and his million epithets are the figures indicating Siva. Brahma of the Hindu theology is supposed to be the analogue of the Saturn of the West while Jupiter represents Vishnu and Siva.

(2908) TRISUL . . . A trident, the Symbol of Siva once used on a copper paisa weighing 98½ grains for circulation in the province of Benares only.—*Prin. Ind. Ant.*

(2909) TUBA of Mindoro or Tuac of Timor and the Moluccas, the sap of a palm, converted by distillation or fermentation into spirit or vinegar.

(2910) TUKBEER, Arab. The Mahomadan creed.

(2911) TULIPA STELLATA.

Lallee waroon, HIND	Nulkia, HIND.
Myhoula, „	

It is abundant in the Kangra valley and the Kemaon Hills, whence its bulbs, which are edible are exported.

(2912) TUMONGONG, amongst the malays, a high officer of State, to whom the superintendence of internal police matters is entrusted.—*Journ. Ind. Arch. No. IX. Vol. V. p. 568.*

(2913) TURANIAN TONGUES. Amongst these are the Naga, Dhimali, Hayu Kuswar, Kirauti, Limbu, Chepang, and Bhramu, of which the first is Indo Chinese, and the rest Himalayan, all belong to the pronominalized class.—*Mr. Hodgson No. 6 of 1856 of Beng. As. Soc. Journ.*

(2914) TUS or TUZ, a Birch bark, which, in addition to leather, we learn that the ancient Persians wrote upon. The same seems to have been anciently used in the North India also. In Huen Thsang's time the early Buddhist scriptures of Kasyapa's Council were written on the leaves of the Tala palm. In the eleventh century, according to Alburini, paper was used; in the south of India the leaves of the Tari were used, but in the provinces of Central and Northern India, they used the inner bark of a tree called tuz. And it was the branch, of a tree of the same kind called Bhoj, with which they covered their vessels.—*V. 2. p. 46.*

(2915) TUWA or TAWA, HIND. An iron girdle on which cakes are baked.

(2916) TWASHTRI, the vulcan of Hindu mythology.

(2917) TYE TINCO, the refuse of opium, used by the poorest Chinese in Singapore.

(2918) TYPHA ELEPHANTINA.  
Patera, HIND. | Pudera, HIND.

Leaves useful in making mats.



## U.

(2919) UKROT; The walnut of Chittong is reckoned the best of any produced in the Nepaul territories; but those of Tibet are esteemed superior. The shell of the Chittong, and indeed of most of the Nepaul walnuts, is remarkably hard. The wood is employed in the manufacture of gun stocks. The best charcoal is made of the Bhâng or holly leaved oak.

(2920) UNONA DISCOLOR. Teling Chelkadoooga : Atamaram.—*Rheed.*

A pretty large tree, a native of the mountainous parts of the Northern Circars and of Chittong. The wood is employed for various economical purposes but chiefly for rafters.—*Roxb. Rhode. M. S. S.*

(2921) UPANGAS. Of these, there are four,  
1 Purana, or History comprising the 18 Puranas.  
2 Nyaya, Logic and the principles of knowledge.  
3 Mimansa, Religious Principles and duties.  
4 Dharma Shastra, Law, Human and Divine.

(2922) UPANISHADS. The whole number of Upanishads known at present, is 138, of which only 11 have been published. According to the theory laid down in the Mahavakya Ratnavali, there are 1,180 Upanishads equal to the number of Vedaic schools, one Upanishad belonging to every school. This theory however is fanciful. According to the received definition, the Upanishads are such parts of the Vedas as embody their metaphysical and theological views which may be compressed into the formula that the finite soul is essentially the same with the infinite spirit or Brahma and though the various

Upanishads widely differ from each other, all maintain this identity of the finite and infinite spirit. Dr. Weber arranges the Upanishads into (1) those which belong to the three first Vedas, as forming the Vedanta system; (2) those comprising all the Atharva Upanishads and referring to the Vedanta system in its entire development; (3) the Upanishads in which the meditation has become crystallised and is limited to the mystical word "Aum," (4) those treating on the order of the "Sunnyasi" and (5) the last division which includes the sectarian Upanishads, in which the Atman is worshipped as an independent deity.—*Thomas Prinsep.*

(2923) UPAVEDAS. Of these, there are four, the Ayush, Medicine; Gandhurva, Music; the Dhanush, Warfare; and the Sthapatya, Mechanics.—*Thomas Prinsep.*

(2924) UPPUTAH, the Malayala name of a wood which is hard, strong, and heavy. It grows to about twelve feet high and ten inches in diameter. It is used by the Native carpenters for the frames of boats, of coasting vessels, and similar purposes, where strength is required.—*Edye, M. & C.*

(2925) UQEEQA, ARAB. A sacrificial rite, consisting of an offering to God, amongst the Mahomedans, on the Chutthee or Chillah, of one if a girl or two he goats if a boy.—*Herk.*

(2926) URSUS SEWALENSIS. A fossil bear, discovered by Sir P. T. Cautley in the Sewalik Hills.

## V.

(2927) VACHY WOOD. Mimosa Flexuosa, *Rottl.*

Vaghaymarum, TAM.

This is the Tamool name of a large tree, the wood of which is brown, and is used for making bullock bandies &c.&c.—*Ains. Mat. Med. p. 208.*

(2928) VALLISNERIA VERTICILLATA.  
Poo-natsoo. TEL.

Grows in clear, standing, sweet water. Flowers during the cold season, and consists of simple, filiform roots, and a number of fine, filiform, jointed shoots, or stems; some creeping, some floating below the surface of the water, branches solitary, axillary.

The Berhampore sugar refiners use this herb, while moist, to cover the surface of their sugars, as clay is used in the West India islands, and in

two or three days the operation is finished exceedingly well.—*Roxburgh's Flora Indica V. 3, p. 751.*

(2929) VALMIKI. It is a current belief, in many parts of India, that the poet Válmíki, the author of the Ramayana, was a *thug* or stranger. This notion was probably derived from a strain put upon some verses, which make out Valmiki to have been, originally, on his own confession, simply a robber. This extract also embraces the received account of the origin of the poet's name.

(2930) VAN. The Lake of Van is about forty miles long, and from twenty to thirty broad. Its waters are salt. It is surrounded by a beautiful outline of mountains, whose tops are covered with perpetual snow. The old ruin-

ed stone-built town of Ardische is situated on a narrow strip of land running into the lake. There are a few soldiers quartered in it. The borders of the lake about it are low and swampy, and abounding in wild fowl and various other kinds of game.

(2931) VANILLA. *V. Aromatica* is said by Martins to yield the true Vanilla, but the best Mexican Vanilla, is the produce of *V. Planifolia*, of which Pereira mentions *V. Sativa* and *V. Sylvestris* as two varieties.

(2932) VARDAGOUR, the Malabar name of a tree which is remarkably hard and strong. It is used by the natives for spears, weapons of defence, and such purposes as require the hardest kinds of wood. This tree is known as a jungle wood only.—*Edye, M. & C.*

(2933) VAW KARAI, the Malabar name of a tree which produces the country olives, to which the natives are very partial. This fruit is also food for the wild beasts and birds of the forest: the tree grows to about eighteen feet high, and twelve inches in diameter.—*Edye, M. & C.*

(2934) VAYNGIE in Tamil, and Mulu-Vengah in Malayala. *Pterocarpus Marsupium*. This tree is of a dark olive and light-brown colour; it is very strong and tough; it sometimes grows crooked, and to about two feet in diameter, and from thirty to thirty-five feet long: it is used by the Natives both for houses and vessels. This sort has a single leaf in the shape of a pear, but the VellaVengah, which is the white or light coloured, has a long leaf, and grows to about eighteen inches in diameter, and twenty feet long. The natives prefer this wood for boat crooks, and the curved parts of the frames of pattamahs and native vessels.—*Edye, M. & C.*

(2935) VEDAS. These are generally considered as four in number, the Rich, the Yajush, the Sama and the Athavarah, but the last of these evidently belongs to a much later age than the rest. The hymns of the Rich Veda are repeated entirely in a disjointed form in the Sama; and, with little alterations in the Atharva, also. While the Yajush contains principally forms of prayer. Portions of the Rig-Veda have been translated by the late F. Rosen, the late M. Langlois, and by Professor Wilson. And Dr. Muller is producing a complete one at the expense of the E. I. Company. The 3000 pages of large quarto which have already appeared, embrace little more than half the Sanhita with Sayanas' Commentary.

The body of Vedic literature is immense. In the Brahmanas, which are considered as belonging to the Vedas, moral precepts, religious instruction and information are conveyed. Professor Wilson supposes them to belong to the 8th century before Christ, and they are said to recognise the institution of caste. Very little is

known of these works, which are less interesting than the Sanhitas as being of later date. The Brahmasutras, the chief authorities of the Pantheistic Vedanta school, though much later than the rest, are still mnemonics, as also the Vaiseshika or atomic school of Kanada.

The language of the Vedas is not Sanscrit in the strictest sense of the term, but there is not sufficient difference between it and classical Sanscrit, to authorise its being called a separate language. The difference is not so great as between Anglo-Saxon and modern English, but it is greater than between Homers and Demosthenes Greek.

Good scholars are of opinion that the Vedic hymns were composed mostly about fifteen centuries before Christ, but not committed to writing and therefore not collected until the eighth century B.C. The geography of these hymns confirms the theory that the Aryan Race migrated from Central Asia about seventeen centuries before Christ, entered India by the North West, dwelt during the earliest Vedic portion in the Punjab, and migrated or rather fought their way into Central India during the five centuries that succeeded.

From the frequent mention of the Sursooty and other rivers, we learn that the Punjab was the locality of the Vedic Aryans. The Massagetæ occupied precisely that position to which the legends of Mount Meru and its rivers, (amongst the rivers are the Jaxartes and the Oxus may be clearly traced) point as the cradle of the Aryan race, and the early mention of the Sacæ (Sakyas) and Bactrians (Yavanas) as the principal foreign nations, confirms the supposition that the Aryan race travelled Southwards from the high lands of Central Asia, before entering the Punjab. The Aryans of the Vedic period were but barbarians or nomades. We have mention in their hymns of cities of commerce, merchants, sailors, of weapons of wood and iron of chariots, of heralds, travellers and inns for their accommodation and even of the vices of a primitive civilization.

(2936) VELLAI PUNA PINU, the Tamil name of a tree, which is the white peon pinu: it can be procured on all parts of the coast of Malabar. It grows to seventy and eighty feet long, and to three feet in diameter; the natives use it for the masts and yards of dories and country vessels. It is more like the American white pine, and the upright yellow wood at the Cape of Good Hope. (Antinaguatis), than any wood seen.—*Edye, M. and C.*

(2937) VELLA VENGAI, the Tamil name of a tree, the wood of which is of a light colour, and very tough and strong, and is used by the natives for the frames of vessels, or where strength is required; it grows to about eighteen inches in diameter, and twenty feet long, and the small branches make good boat crooks.—*Edye, M. & C.*



## VICHITRA VIRYA.

(2938) VELATTI, the Tamil name of a wood which resembles the English pear tree. It grows to about twelve inches in diameter, and fifteen feet high: it would answer well for carve-work, from the fineness of its grain.—*Edye, M. & C.*

(2939) VELLIELLUS, a tree of little use; it is used by the natives for house work; its growth is small, and it is rather scarce.—*Edye, M. & C.*

(2940) VELLE-ELow, the Malayala name of a tree that grows to about sixteen feet high, and eight inches in diameter. It is used by the carpenters for the frames and knees of country vessels. It produces a white seed which the natives use medicinally.—*Edye, M. & C.*

(2941) VELLIE PUNA, known in Malabar as the white or Cat-Puna. It grows to about eighteen inches in diameter, and eighteen feet high and is used by the native carpenters for the frames of vessels. It grows curved; and is not durable. It is not found in any quantity in the forests.—*Edye, M. & C.*

(2942) VEMBAH, the Tamil name of a tree, which grows in Travancore, it is close grained and of a yellow tinge, and grows to about twenty-feet long, and fifteen inches in diameter; it is used for native purposes. The bark of this tree is stripped and used by the natives in cases of eruptions on the skin; and also to purify the blood after fevers, for which it is considered most valuable.—*Edye M. & C.*

(2943) VENARAH, the Malayala name of a jungle-tree which grows to about twenty-four feet in height, and eighteen inches in diameter. It is used in building native vessels and for other native purposes.—*Edye M. & C.*

(2944) VENDIDAD SADE, a religious book of the Parsees. See ZOROASTER.

(2945) VENGENDAH, the Tamil and Malayala name of a tree which the natives use for catamarans and rafts for heavy timber; it is remarkably soft and spongy, and not of much use or durability.—*Edye, M. and C.*

(2946) VETTE MARAM, the Malayala name of a tree that grows to about twelve feet high, and eight inches in diameter. Its wood is much admired on account of its handsome dark streaks of black and brown, with white and yellow ground. It is very much like ebony in grain, and also in leaf. It produces a flower which is considered sacred: and is used for decorating the women on days of ceremony at the pagodas.—*Edye. M. and C.*

(2947) VICHITRA VIRYA married Amba and Ambahka, daughters of the King of Kasi, who had issue after his death by his half brother Krishna dwaipa yana or Vyasa, Dhirita rashtra and Pandu, whose wives bore the five Pandavas viz.

- 1 Yudishtira.
- 2 Arjuna, father of Parikshita,
- 3 Bhima.

## VIRAM PILA OR JACK-WOOD.

- 4 Nakul
  - and
  - 5 Sahadeva,
- } who founded the Magadha line.—*Prinsep by Thomas.*

(2948) VIJAYANAGAR. The family genealogy deduces a descent in the direct line from Pandu of the lunar dynasty, and imperfectly follows the Pauranic lists to Chandrabija, the last of the Magadha Rajas. The first in authentic history is Nanda, A.D. 1034, who founded Nandapoor and Warangal. Between A.D. 1524 and 1565, Rama Rajah was killed in an invasion of Nizam Shah Bhairi and Imad-ool-Mulk. In the time of Tepu, Sultan Khan took the country in the name of Tepu, and in 1829, the dynasty became extinct with Vera Venkatapati Rama.—*Thomas' Prinsep.*

(2949) VIKRAMADITYA, B. C. 56. Samvate era.

(2950) VIKRAMADITYA ERA. The era of Vikramaditya, is in general use throughout Telingana and Hindustan, and is called Samvat or vulgarly Sambut. The prince from whom it was named was of the Tuar dynasty and is supposed to have reigned at Ujjain (Ujjayini) 135 years before Salivahana, the rival founder of the Saka era, South of the Nerbudda. The Samvat era commenced when 3044 years of the Kali Yug had expired, i.e., 56 years B.C. It is known, though less used throughout Bengal, Tirhut and Nipal and is nearly unknown in the Peninsula.—*Thomas' Prinsep.*

(2951) VIKRAMADITYA THE GREAT, flourished in 56 B. C. he was a munificent patron of art and letters.

All the most readable Sanscrit Hindu works, the drama, the lyric, the sentimental and philosophical Kavyas, as Nalas, and the Bhagavad Gita, the Romantic histories and historical romances, the fables, Hitopadesa, Vetala Panchavinsati, and so forth, and most of the works on science, belong to the first ten centuries of the Christian era.

(2952) VIRAM PILA OR JACK-WOOD. This is the Tamil and Malayala name of a tree which is well known to Natives and Europeans. It grows in the native cultivated grounds, and pays a duty to the Government. This tree is of the greatest value to the natives, in consequence of its fruit, which forms part of their food. In Ceylon it supports the pepper-vine. In many places it is found two feet and a half in diameter, and from thirty to thirty-five feet high. In Canara this wood was preferred by Tipu Sultan for the Grab vessels built at Honore, the naval depot. In Ceylon, at Point de Galle, it is used by the furniture-makers for chairs, couches, &c., for which purpose it answers well, and, if polished with care, its brilliant colour is superior to that of Mahogany. When worked and cut down it is yellow, but turns dark and improves by age.—*Edye. M. & C.*

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(2053) VISHNU PURANA. The fourth book of this work contains all that the Hindoos possess of their ancient history. It is a tolerably comprehensive list of dynasties and individuals: it is a barren record of events. It can scarcely be doubted however but that much of it is a genuine chronicle of persons, if not of occurrences. The Vishnu Purana has kept very clear of particulars from which an approximation to its date may be conjectured. No place is described of which the sacredness has any known limit nor any work cited of probable recent composition. The Vedas, the Puranas, and other works forming the body of Sanscrit literature are all named; and so is the Mahabharata to which therefore it is subsequent. Both Bauddhas and Jains are adverted to. It was therefore, written before the former had disappeared; but they existed in some parts of India as late as the twelfth century at least, and it is probable that the Purana was compiled before that period. That it is discredited by palpable absurdities, in regard to the longevity of the princes of the earlier dynasties, must be granted, and the particulars preserved of some of them are trivial and fabulous. Still there is an inartificial simplicity and consistency in the succession of persons, and it is not essential to its credibility or its usefulness that any exact chronological adjustment of its different reigns should be attempted. Deducting however from the larger number of princes a considerable proportion, there is *nothing* to shock probability in supposing that the Hindu dynasties and their ramifications were spread through an interval of about twelve centuries anterior to the war of the Mahabharata and conjecturing that event to have occurred about fourteen centuries before Christianity, the commencement of the regal dynasties of India is thus carried to about 2600 years before that date. After the date of the great war, the Vishnu Purana, in common with those Puranas which contain similar lists, specifies kings and dynasties with greater precision and offers political and Chronological particulars, to which, on the score of probability there is nothing to object.—*Professor Wilson, pages 64, 65, 70 and 71 quoted at page 235 of Thomas' Prinsep Vol. II.*

(2954) VOLCANOES OF INDIA. By Dr. BUIST.

In touching in last year's Report on the subject of volcanoes and volcanic appearances, real or supposed, in India, I was led to the conclusion that there were in all likelihood not a few of these which wanted sufficient proof to satisfy us of their reality; and I instanced two cases as probably belonging to this category—that of the eruption in the Zabayar Islands, described by Captain Barker as seen in 1846, and the luminous appearance off the coast of Arracan, which, in my inability of laying my hands on the account of the matter which I knew had

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been published somewhere, I thought very likely to have been the result of some of those causes of luminosities which are now known to be of such frequent occurrence at sea. On both points I have since seen good reason to change my opinion, and the occasion of making the required correction seems to be a favourable one for the preparation of a short paper on volcanic phenomena in India. My own means of observation have been in this matter very limited—the only volcanic regions I have actually examined are those to the westward of Kurrachee, and on the South Arabian coast, and those of the Red Sea, much of the most important information in existence on the subject lies hid in the Reports of the Meetings of the Beugal Asiatic Society, which have unfortunately not been indexed, the Table of Contents and Index to the Papers affording no light as to what occurs at the meeting. The subject is the more important as it is obvious from the latest editions of the works of Sir C. Lyell and Mrs. Somerville that they have fallen in with only a small portion of what has been published on the volcanic phenomena of India.

The following letters will set the question as to the Zebayer eruption completely at rest:—

“Sir,—With reference to an article which appeared in the *Bombay Times* of 9th ultimo, wherein you suppose ‘I was misled by appearances, in mistaking the smoke issuing from the Hindostan steamer, for smoke issuing from the summit of Saddle Island, one of the Zebayer group,’ I beg to forward the accompanying statement from Captain Lovell of the P. and O. Steamer Oriental, (but at that time in command of the Hindostan,) by which you will perceive it to be impossible I could have made such a mistake; and it will also account for Captain Lovell not noticing the smoke issuing from the island, inasmuch as we must have been in a line with the island from the Hindostan at the time she saw us. I am perfectly convinced there was neither mistake nor delusion. The smoke was first pointed out to me by Assistant Surgeon Nicolson, and seen by all on board the Victoria, not at one moment, but at different periods; and at the time it was first seen, the Hindostan was to N. N. W. of the Quoin Rock, the northernmost of the Zebayer group, and distant from the Victoria at least 16 or 18 miles, in a contrary direction. I should not have been justified in approaching nearer to the island as we were “dead to windward of it,” and it was blowing violently. The vessel's speed being reduced from 7 to  $4\frac{1}{2}$  knots per hour; force of the wind 9, height of waves 5. J. W. BARKER,

Commander, Indian Navy.

P. S.—With regard to no notice having been taken of the explosion by the native craft, you must bear in mind that the island is quite out of their track, inasmuch as they always navigate



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the inner channel ; and even supposing they had seen it they would probably have viewed it with the same apathetic indifference our Arab pilot did—merely exclaiming, Verily, it is the work of evil spirits..

14th August 1846. 8 A. M.—Passed Jibbel Teer all sail set with a light breeze from Nd.

9. A heavy black cloud, rising rapidly from the S. W., which in half an hour formed into about a dozen large water spouts.

10. Saw the Quoin Rock.

10. 30. The squall burst upon us with heavy rain and blowing furiously, with much lightning and a continuous roll of thunder, which had a very peculiar sound, as if close upon the water. Hauled out S. by W. Ship steering previously S. S. E. At 11.30 the rain abated a little : saw the Zebayer islands bearing easterly, distant about 7 miles—and a steamer between us and the islands, distant from us about 4 miles. The weather continued thick and squally, with much lightning, till we got as far as Mocha.

The Barometer was very slightly affected by it.

Henry P. LOVELL,

*Acting Commander Steamer Hindostan.*

I was on board the steam vessel Victoria at the time that Commander Barker alludes to, and noted down at the time, all the circumstances relating to this sudden outbreak of Saddle Island, and I give you the substance of my notes, from which you will at once see that your explanation does not tally with the facts of the case :—‘ 14th August 1846, off Sobayer Islands, lat. 15° 7' long. 42° 12,' on the voyage to Suez. The whole forenoon has been calm and excessively sultry. Skies overcast ; particularly dark and threatening towards the N. W. Thermometer 95°. Sighted the Peninsular and Oriental Steamer bound for Aden : she passed about four miles to the west of us as we were closing in with the group of Islands. Soon after she passed a violent squall from the N. W. burst upon us.

It was accompanied by a drenching shower of rain, heavy peals of thunder, and vivid flashes of lightning. Ship going about eight knots during the forenoon—reduced to three knots when the squall came on : temperature brought down to 80 degrees. Passed along the western side of the Sobayer group of islands. When opposite to Saddle Island (one of the Sobayer group,) and only about three miles distant from it, observed a column of smoke issuing from the summit of one of its cones. The squall was then at its height. The column gradually increased in size, while at the same time, distinct jets of smoke issued, as if from numerous small apertures round the outer margin of the cone. Before the squall burst, the summit of the island was perfectly clear. After passing the island, and while it continued in sight, we observed the smoke. This sudden change affected almost

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every one on board, less or more, with a feeling of languor and depression of spirits : several individuals, and I myself was one of them, complained of great uneasiness and sickness at stomach.’ This is the substance of my note, and it clearly shows that your mode of explaining away is without any foundation in fact, for both steamers passed along the same side of the Zebayers, and when we first observed the smoke issuing from Saddle Island, which was then due east of us, the Bengal steamer was well down nearly due south of us, while the wind blew very fresh from the N. West.

Suez, 6th November, 1850,” J. G. N.”

This furnishes one more illustration to the hundreds we possess of the intimate connection betwixt earthquake, volcanic, and meteorological phenomena so well adverted to by Captain Baird Smith. During the Cleopatra’s hurricane of the 19th April 1847, and again at the period of the land squall on the 6th April, 1848, the magnetic instruments at Bombay continued in a state of great disturbance for upwards of two days.

The following note of the loss of polarity by the needle during a whirlwind is given in a letter in the Bombay Times, May 30, 1846 :—

“ There is a class of magnetic local perturbations apparently confined to these seas, one of which was experienced by the Queen on her late voyage from Aden, which we do not remember to have seen noticed by magneticians. When about three hundred miles from Bombay the people on board the steamer observed the atmosphere get suddenly clouded all around with that strange lurid appearance which indicates the approach of a burst of rain or hurricane. By and bye appeared overhead those strange and turbulent vapours commonly attendant on a whirlwind or waterspout,—and a light whirlwind accordingly made its appearance. At this time the magnetic virtue of the compass appeared to vanish : the needle lost its polarity and traversed equally in all directions. A state of matters so surprising was of short endurance : the sky cleared without a tempest, and all went well again. It is we think about two years since an accident of this sort was met in with by the H. C. schooner Mahi on her way from the Persian Gulf. She was surrounded by beautiful groups of whirlwinds and waterspouts ranging about her in all directions, when suddenly the needle lost its polarity and continued for some time useless for the purpose of steering. We are unable to lay our hands on the account of the circumstance published at the time, but remember perfectly its occurrence. To these we may add many others. Dr. Bradley has clearly established the fact that our lesser whirlwinds at all events are either due to direct electrical agency, or, are characterised by the most striking electrical exhibitions.

The occasion of making these corrections seems a most suitable one for throwing into

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connected form the information that lies scattered up and down in a multitude of different quarters in reference to volcanoes in India meaning by this general term within the region betwixt Burmah and the Red Sea, between the parallels of 10 and 30. These consist of the group betwixt Barren Island and Chittagong, which terminate the vast Molucca band — of the band stretching westward, consisting mostly of hot springs and mud volcanoes betwixt the Nerbudda and the sea coast of Suez — a range of above 500 miles in length, and the magnificent region extending from Aden to near Ankobar betwixt 10° and 12° 45' N. lat. and 40° and 45° E long.—a base of full 400 miles, and extending to Gibbel Teir, 15 30 N., a distance of 350 miles, with probably little diminution, in its breadth.

### *Volcanoes in the Bay of Bengal.*

“One of the most terrible active group of volcanoes in the world,” says Mrs. Somerville, “begins with the Banda group of islands, and extends through the Sunda group of Timor, Sumbawa, Bali, Java, and Sumatra, separated only by narrow channels, and altogether forming a gently curved line 2000 miles along; but as the volcanic zone is continued through Barren Island and Narcandam in the Bay of Bengal, (lat. 12° 15,) and northward along the entire coast of Arracan, the entire length of the volcanic range is a great deal more.” [Physical Geography, vol. I., p. 257, Ed. 1851.] The band is not as will presently be seen, limited to Arracan, but extends northward to Chittagong, lat 22° or 600 miles beyond Barren Island. The first description we possess of the volcano in question is that of Lieutenant Colebrook, [Asiatic Researches, vol. III p. 396,] who visited it in 1787, when it was in a state of violent activity; he does not seem to have landed on it, and he quotes entire the account of it given by Captain Blair in his survey of the Andaman Islands. The cone which springs from near the level of the sea, rises at an average of 32° 17, to 1800 feet nearly. [Later authorities make it 500 feet, and this is probably its true altitude, Captain Blair gives no separate representation of it on his chart; he merely sets it down as a volcano,] Mr. Lyell gives the following account of it—he quotes Von Buch as his authority, a work I have not been able to consult:—“Barren Island, in the Bay of Bengal, is proposed as an illustration of the same phenomena” (that of ancient craters, of elevation, as contrasted with modern craters of eruption) “and here, it is said, we have the advantage of being able to contrast the ancient crater of elevation with the cone and crater of eruption in its centre. When seen from the ocean this island presents on almost all sides a surface of bare rocks, which rise up with a moderate declivity towards the interior: but at one point there is a narrow cleft, by which we can penetrate into the centre and there discover that

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it is occupied by a great circular basin, filled by the waters of the sea, bounded all round by steep rocks, in the midst of which rises a volcanic cone, very frequently a source of eruption. The summit of this cone is 1690 French feet in height, corresponding to that of the circular border which encircles the basin so that it can only be seen from the sea through the ravines.” [Elements, 1830, Vol. I. page 390. This seems to be taken from Captain Blair’s estimate of 1800, since upset, as already stated, by Captain Miller, Dr. Adam, and others.] Barren Island was visited by Dr. John Adam in 1831. The water close in shore was then hot and steamy, while steam and smoke issued from the crater, but no lava or flame. He estimates the diameter of the base at about 800 or 1000 yards, and the orifice of the crater, which occupies the entire summit of the cone, at about 30. [Bengal Asiatic Transactions, 1832, Vol. I.] The latest description that has been published of Barren Island is that of Captain Miller, who visited it in 1834. [Calcutta Journal of Nat. Hist., 1843, Vol. III.] His account of it is the same in its general features as that of Lyell, but he estimates the altitude of the cone at no higher than 500 feet; and considering the limited distance to which it is visible at sea, this seems to be more correct than other estimates. He sets down the slope of the cone at 45, which would give an altitude of above 1,000 feet, were Dr. Adam correct as to the diameter of the base. He states that it could only be ascended by climbing, and it is probable that Captain Blair’s assumption of 32.17, which was determined by measurement, may be near the truth. The volcano, like the others along the bay, is chiefly active during the S. W. monsoon.

Next to Barren Island is the volcanic island of Narcandam, lat. 13° 22. The cone, is about 800 feet high, no soundings are to be had within half a mile of the shore [Report of Calcutta Coal Committee, 1839.] Crossing over to the other side of the bay where perfect tranquility seems for nearly a century to have reigned, we find a period when the Coromandel Coast was as much moved by volcanic agency as that of Arracan itself.

The earliest account we possess of any actual eruption in the Bay of Bengal is that contained in the 1st vol. of the Annual Register, 1776, reprinted in the Bengal Asiatic Transactions of 1847. [Bengal Asiatic Transactions 1847, vol. xvi p. 499 Reports and Asiatic Researches, vol. I p. 175.] It was written by an officer on board a French East Indiaman, and addressed to his friend at the Hague: there seems no reason to question its perfect accuracy. In July 1757, fires were seen from Pondicherry to break out on the surface of the sea three or four leagues from shore. These blazed out with the greatest fury, throwing up pumice stone



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and combustible matter. This was accompanied by a noise like thunder, or the discharge of heavy ordnance. An island a league in length and about the same in breadth, with a cone and crater in the centre, then appeared. A vast quantity of dead fish were afterwards seen floating on the surface of the water, destroyed by the eruption. The sea was some days afterwards so covered with pumice stone that vessels found it difficult to make their way through it, while they ran the risk of being burnt from the showers of hot ashes with which the air was darkened. The island seems speedily to have subsided again as we hear no further mention made of it. A shoal, called the Goris Bank, was seen by H. M. S. "Melville" in a line joining Pondicherry and Chittagong, and a shoal is noted on an old chart as having been met in with by an American ship in the line betwixt Pondicherry and Chedooba: both these have since then disappeared. Mr. Piddington remarks that the middle of last century was the great epoch of earthquakes all over the world. [Mr. Piddington on the subject of eruptions.—Bengal, Asiatic Transactions.]

In 1750 Chili was visited by an earthquake, by which the Town of Concepcion was destroyed: the sea rolled over it, and the entire port, from thenceforth became useless. The whole shore seems to have sustained an upheaval of about 24 feet; and shells similar to those found in the adjoining seas are now abundant on mountains above 1000 feet high, [Lyell's Elements, vol I p. 440 edition 1850, p. 431, gives it 1848 English feet.] On the 15th September, 1751, the capital of St. Domingo was destroyed by an earthquake, and part of the coast, 40 leagues in length, sunk down, and has ever since formed a bay of the sea. The Lisbon earthquake, one of the most fearful on record, occurred in November, 1755, and in 1757 the Azores were struck with an earthquake, during which eighteen small islands arose, about 200 yards from the shore: these corresponded very closely with the Pondicherry explosion. The following extract is from Dr. Thomson's paper on the Geology of Bombay (Mad. Lit. Trans.) It bears directly on the subject, and carries us three centuries further back: I have not considered the description specific enough for the text, but see no reason to doubt the authenticity of the fact:—"The island of Vaypi, on the north side of Cochin, rose from out the sea in the year 1341: the date of its appearance is determined by its having given rise to a new era amongst the Hindoos, called Puduvepa, or the new introduction. Contemporaneously with the appearance of Vaypi the waters, which during the rainy season were discharged from the Ghaut, broke through the banks of the channel which usually confined them, overwhelmed a village, and formed a lake and a harbour so spacious that light ships could anchor where dry land for-

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merly prevailed."—Bartolome's Voyage to the East Indies Rome 1796; Translation 1800.] The volcanic region in the Bay of Bengal seems about the year 1750 to have been in a state of general activity. Off the coast of Arracan, lies an island called Chedooba situated in lat 18°50' N. and long, 90°40,' fifteen miles in length and seventeen in breadth, or of about 200 square miles in area. Its general appearance is that of a fertile, well wooded island, of moderate height and irregular outline. A band of level land, covered with fragments of coral shells, and gravel, and but a little way elevated above the sea surrounds it: three distinct terraces are visible, the result of so many separate upheavals. [Captain B. Smith, in his admirable paper on Indian earthquakes, published in 1842.] Bl. As Trans, Vol. XII, gives an account from the "Gentleman's Magazine" of a violent earthquake which occurred at Calcutta in 1737. Twenty thousand vessels of various sizes are said to have been destroyed by the inundation which accompanied it, and 30,000 lives are said to have been lost on the occasion. No volcanic phenomena, strictly so called, seem to have attended it. It took place during a furious hurricane. The earliest Indian earthquake of which particulars are given is that which accompanied the hurricane of 26th May 1618, by which 2000 lives and 60 vessels are said to have been lost at Bombay [See Madras Lit Trans 1837 already quoted from Gower's Portuguese India tome III.] There are four large volcanoes in Chedooba, detached mounds rather than cones, varying from 100 to 1000 feet above the level of the sea. They are composed of stiff grey clay, with large quantities of singular fragments of stone: their sides are much cut up with rain; their summits, which are from 50 to 240 yards in diameter, are quite bare.

(Abridged from Capt. Halsted's Report on the Island of Chedooba Bl As. Trans. 1841, vol. X. p. 434. Capt. Halsted gives maps of the islands of Chedooba and Regwan, adjoining to it. The latter is copied into Johnstone's Physical Atlas, map 3.) On the summits of these are numerous well formed cones, from a few inches to four feet in height, and about the same in diameter. On the outside they are hard, within they are filled up with a thick, uniform, well-mixed mud, which every now and then runs out at the side or over the edge of the crater, bubbles of gas rising at intervals of three or four minutes; there is no appearance of eruptions of lava scoria, or vestige of the agency of actual fire: some of the volcanoes throw out hot sea water in place of mud: they are most active during the rains, and then occasionally emit flame and stones, as well as mud, throwing these to a considerable height: the stones are obviously torn from the beds through which the water passes; portions of copper occasionally adhered to them. Petroleum wells abound here, as they do all round the

neighbourhood. Capt. Halsted visited Chedooba in 1841 and his survey in the "Childers" extended above 100 miles along the coast. The shore here is marked by three well-defined terraces, or raised beaches, covered with coral and shells, and manifestly the result of three distinct upheavals, with considerable intervals—of just a century, the natives believe, betwixt them. The uppermost of these is less conspicuous and distinct than the two lower, but on the western coast a remarkable column of rock stands out on the beach, about 40 feet high, with oyster shells still attaching to it, showing the second line of beach, just thirteen feet above the first. The last of these was said by an old man of 106, who remembered it when he was a lad of 16, to have occurred about the year 1750. [Note. Mrs. Somerville. (Physical Geography, vol. I. p. 254,) speaks of these as the result of gradual upheavals going on within the last hundred years: it appears to have been the effect of sudden and instantaneous elevation, occurring just a century ago. There is no evidence of any subsequent change of level having occurred within this period along the shores of the Bay of Bengal] Mr. Piddington suggests that it is not unlikely that it may have occurred simultaneously with the eruption at Pondicherry in 1757—natives being proverbially inaccurate as to dates—during the occurrence of violent earthquakes, when the sea washed several times over the lower part of the island, and then permanently retired as the land, emerged. Captain B. Smith thinks it likely to have occurred during the Chittagong earthquake of 1762. Immense quantities of fish were found on the recovered land, and the feasting which occurred on these is still a favourite tradition in the islands: no rent occurred in the earth, and no lives were lost, or mischief occasioned: for more than half a century much of the soil remained salt. The elevation has been greatest towards the centre of the line examined, where it is twenty-two feet; at the termination it is thirteen, and at Foul island mine, Regwan, lat.  $18^{\circ} 37' 49''$  just to the north of Chedooba, is marked by three distinct risings, [Note of Lieut. McVulloth, R. N. Map of Ragwan. Bl. As. Trans; Johnstone's Physical Atlas.] each about eight feet: the outer portion of the island was said to have been raised about 1760—most likely as Mr. Piddington supposes, 1757. The original island contains two terraces, about nine feet high—the outer margin is as yet barren; it consists generally of corals, shells, and gravel; the rest is a level plain of rice fields. In the adjoining island of Ramree, or Rumbree, off Kyouk Phyoo, there are some beautiful mud volcanoes, the cones of which are almost all covered with luxuriant casuarina trees—the only places where they are found in the neighbourhood. The craters and expelled matter possess the same

[Note. Dr. Spry. Bl. As. Trans. 1851, vol. x. p. 1845.] This was first described by Lieut. Foley, in vol. 4th of the Asiatic Journal: the cones are said by him to vary from five to 1500 feet, one peak, called Teaka, reaching the altitude of 3000. Vapour and flame were seen to issue from one of the peaks during the earthquake of 26th August 1833.

There are various hot springs at Chittagong subject to periodical eruptions, and which constantly emit gas and flame.

There is a small volcano near Kyouk Phyoo in a constant state of activity, and which frequently emits smoke and flame. Cottages at the distance of four miles from it were on the occasion of the eruption of 1842 brightly illuminated, yet so little was the heat that the specimens from the crater were no where melted.

Within little more than ten years of the elevation of the island off Arracan a catastrophe, precisely the opposite of that from which Chedooba suffered, overtook Chittagong. During the great earthquake of April 1672, sixty square miles of the lowlands along shore were permanently submerged: Ces-lung-toom, one of the Mug Mountains, entirely disappeared, and another sunk so low that its summit only remained visible. [Phil. Transactions, 1763, given entire in Capt. Smith's paper on earthquakes, Bl. As. Trans. vol. xii. p. 1047, quoted in Report of Coal Committee, republished in the India Review, 1839. p. 71. I have introduced the passage, into the text nearly unaltered.]

Four hills are described as having been violently rent asunder, leaving open chasms, varying from thirty to sixty feet in width. Other mountains and hills were variously disturbed; some were partially thrown down so as partly to disturb the courses of rivers. One eminence became degraded by little and little till it returned to the level of the plain. In the plain, the earth opened in several places throwing up water and mud of a sulphureous smell. At Barcharra 200 lives were lost on a track of ground that sunk suddenly. It is said that at Arracan the effects of the earthquake of 1772 were not less fatal to human life and property than those of the Lisbon one in 1755; while at Dacca the waters rose so suddenly as to throw all the boats on shore, on its retirement sweeping multitudes of human beings away. From the notices of islands now no longer to be found on the western shore of the Bay of Bengal, in the accounts of Arab navigators, there can be no doubt whatever that numbers of these have been from time to time submerged. [Mr. Torrens, Bengal Asiatic Journal Reports, Feb. 1845. p. XXVI; Ibid p. XXII.]

About an hour after sunrise on the 26th July 1843, the inhabitants of Chedooba and Flat Island heard a great noise, and saw fire rising out of the sea; an earthquake had been felt just before—this continued for four days, when on the



29th a small island seemed to arise above the surface of the waters: It continued visible for about a month, but it was now the monsoon, and the weather was too boisterous to permit its being approached. In October, on the return of the fine season, search was made for it, but no trace of it could be found. A careful survey of the spot was afterwards instituted by order of Government, but no indication of commotion, and no change in the aspect of the shore, or bottom of the sea was discoverable. [Ibid, Dec. 1843, Vol. XII, Ibid, Vol. II. p. 1117.]

On the 2nd January 1845, between the hours of six and seven p. m., about an hour after sunset, the people of Kyouk Phyoo, on the coast of Arracan, were astonished to see the eastern horizon to seaward become brightly illuminated: it continued flickering, like the reflection of distant flame from a ship on fire, for about half an hour, when suddenly immense volumes of flame were seen to burst as if from the depths of the ocean, presenting a most sublime and awful spectacle to beholders. It was accompanied by a low continuous rumbling sound, which seemed to ascend from the bowels of the earth, and was re-echoed from the hills around. The duration of the exhibition is not mentioned, though it was seen by many witnesses: it seems to have been very transient. A vessel was sent out to sea immediately, under the impression of its being a conflagration, but saw nothing. Government, on being applied to by the Asiatic Society, instituted a careful survey of the coast, but no change in the depth of the soundings or character of the bottom could be discovered. There can at the same time, remain no reasonable doubt that the exhibition was volcanic—probably a sudden emission of gas through an aperture or crevice not detected by the sounding line. [Three accounts of this most singular occurrence are given with minuteness in the Reports of Proceedings of the Bengal Asiatic Society for February 1845, p. 24-28, not indexed. The best account is that of Lieut. Hawkins.]

The extreme frequency of earthquakes in Assam would lead to the inference that it was the theatre of lively volcanic action. No fewer than twelve of these occurred betwixt May 1834 and May 1835. "About twenty years ago," says Dr. McCosh, writing in 1837—that is about 1817, "the natives inhabiting a small knoll near the hill of Goalpara were so terrified by the unusual shaking of their little hill, that they fled from it for safety, and ran to a distance: on their return their houses and hill had disappeared, and a large pool of water, thirty or forty feet deep, occupied its place." [Topography of Assam, by Dr. McCosh. Calcutta 1837.]

The region of recent direct volcanic action seems, so far as we at present know, to terminate with the extremity of the Delta of the Ganges. [Col. Conesley, Bl. As. Trans. Vol. XVII. p. 1.]

A few hot springs are all we have to indicate the agency of a subterranean fire for nearly 1000 miles across the Peninsula. There are hot springs in the Damoodah valley, 23° 10' N. in Gangetic India, in Kunawar, in the lower Himalayas, and near Lohunkund, on the Sutlej. The most notable of these is that at Sargunga, near Chota Nagpore, in Central India, where the temperature of the water is 184°: it smells strongly, and seems to be a Harrowgate. [The following is from Capt. Baird Smith's memoir on Indian Earthquakes. I have not met in with the work of Dr Falconer referred to as expected in 1843, nor, indeed with any more recent account of the field of fire than about to be given: but from the frequency of our visits at Cashmere since 1846, I should suppose it must have been frequently since described.]

"Whether recent travellers who have explored the valley of Cashmere have collected any further evidence as to the former condition of the province, I am unfortunately unable to say, as I have not yet been able to consult their works. That indications of active volcanic action are numerous and remarkable, I learn from Dr. Falconer, the latest of the Cashmerian travellers. He informs me that a singular 'field of fire' exists in the valley, of considerable dimensions, and through crevices in which flames continually issue, the outlines of this volcanic tract are distinctly defined and the action appears to be strictly local, the soil is completely burnt, and in some spots I believe, vitrified. The igneous action has continued now for upwards of two centuries, as the existence of this remarkable spot is certified by Abul Fazil, the learned minister of the Emperor Akber. [Second Report on Geology of Hyderabad.] Dr Vosey describes a hot saline spring near Hyderabad in the Deccan. [For the above particulars, I am indebted to Dr Falconer. They were given verbally, and are quoted from memory, so that they are rather indefinite; but as Dr Falconer's own account of the phenomenon may be expected ere long, it will be in my power to correct and enlarge the above notice.] Mr. Moorcroft in his travels, (Vol. ii. p. 277) mentions a hill within three days' journey of the city of Cashmere, from which loud explosions are heard at intervals, accompanied by the escape of gaseous matter, with force sufficient to tear off the doors and windows of buildings situated upon it. There was nothing on the hill resembling a crater, but the inhabitants on the spot asserted a distinct recollection of the explosions."—Bl. As. Trans. vol. xii, part II for 1843. p. 1046.] In the Concan there are no fewer than twelve hot springs betwixt Dasgaum and South Rajpore, and they are supposed to follow the line of the great Ghaut chain southward to Ceylon: the majority occur near the great lines of dislocation. There are two hot springs in Candeish

and several in Kattiawar, and lower Scinde, as we shall presently see, abounds with them.]

Lake Loonar, in the Sihal Hills, is the only instance of a volcanic outburst observable in this immense Plutonic region. [Malcolmson, London Geological Transactions 1839. It was first described by Lieut Alexander, in the Madras Literary Transactions, subsequently by Mr. Orlebar in the Bombay Geographical Transactions.] It is a nearly circular or oval depression in a country composed entirely of tabular and nodular basalt: it is 500 feet in depth and three or four miles in circumference. In the bottom of the hollow is a lake five feet deep, the waters of which are impregnated with muriate and sulphate of soda, and sulphate of lime; subcarbonate of soda prevails in the neighbourhood. In 1851 it was examined by Dr. Bradley, who met with abundance of scorix in the neighbourhood, and was able to trace a vast stream of lava to the east and westward. The great intervals betwixt the points of volcanic activity in this part of India, even when connected by hot springs, prevents them from being associated as groups anywhere betwixt Arracan and Cutch.

On the 27th May, 1846, a hill on the Nerbudda, called Dumoh Phar, or smoking mountain, about 500 feet high above the plain, gave out alarming moans, to the terror of the neighbourhood, and then an enormous outburst in it occurred. The appearance this presented when examined shortly afterwards by Col. Skene and Lieut. Briggs was such as might have been produced by the explosion of a mine, making a rent in the hill from top to bottom about thirty feet across, and six feet deep. Great trees were upset by it, and the rocks rent twenty to thirty feet in pieces, as if blasted by gunpowder, and thrown to the opposite sides of the fissure. The appearance presented in no way resembled that of a land slip—the bursting force had obviously been from the interior. It was not stated that any erupted matter had been thrown out; there was no appearance of any volcanic vent in the neighbourhood, and no tradition of volcanoes ever having existed. [Bl. As. Trans. vol. xvi.]

In the end of October 1849, something like an ebullition of pestilential gas, the discharge probably of a submarine volcano, occurred off Porebunder in Kattiawar, and was manifest for thirty or forty miles out at sea: the fish were poisoned by it, and for days lay floating in myriads on the surface of the water. [See Report of 1850. B. G. S.] An incident similar to this had occurred at Berampore, in May 1810: the water in a large tank, usually pure, and which for a period of thirty four years had never exhibited anything extraordinary, suddenly became of a dark green colour, and an immense quantity of fish, many of them weighing from eight to fourteen pounds, floated dead on the surface, and were afterwards removed in cart loads, and made

use of as manure, the people ascribed it to an earthquake, [Asiatic Annual Register, vol. xii p 465] which then visited Calcutta.

There is no record of the Cutch volcanoes having ever been in a state of permanent activity, and they seem rather to have played the part of spiracles to the gases of earthquakes, when “the earth, seemed with a kind of colic, pinched and vexed,” with fits of vomiting of lava or of flame. On the border of the chain of mountains, and eighteen miles from Lukput, the most westerly town in Cutch, is a hill believed by the Hindoos at one time to have been a volcano. It has long ceased to emit flame or smoke, but is still an object of worship amongst the Hindoos. [McMurdo's Account of the Province of Cutch, Bombay Lit. Trans. vol. ii., p 210, 4-to edition.] It does not appear to exhibit any vestige of lava, scorix, or ashes; a bituminous earth, with a strong disagreeable odour, is dug out of the side of it, and used as incense in the worship of Assappoora: it is found in small pieces imbedded in the common soil, from which it is separated without difficulty.

On the occurrence of the great earthquake shock of June, 1819, vast clouds of dust were seen to ascend from almost every hill or range of hills in Goozerat and Cutch; smoke was in many cases visible, and some flame was perceived. [Dr. Thomson, in his account of the Geology of Bombay, published in the Madras Literary Transactions for 1837, after describing the hurricane and earthquake which occurred all along the coast on the 15th and 16th May, (the 26th and 27th new style, exactly 200 years to a day before the occurrence of similar events in 1848,) says:—Besides the appearance of a violent commotion in the atmosphere, and a perceptible concussion in the earth, volcanic action seems to have occurred, if we may be allowed to deduce such an inference from the highly embellished representations of the historian, of giants seen in the air throwing great globes of fire at each other, confusion of human voices in the atmosphere, the trampling of horses, and the sound of warlike instruments. It is added that much of this nature occurred in Salsette and other places. (Souza's Portuguese India, tome iii.) “The metaphorical figures,” concludes Dr. Thomson, “expressed in the latter part of the description, are strikingly similar to those employed by Dion Cassius in his account of the eruption which destroyed Herculaneum and Pompei, where we are told, giants were seen, and the sounds of trumpets heard in the vicinity.” There is so little appearance, of any recent volcanic eruption near Bombay that I should be disposed to ascribe the appearance, probably in both cases, to the meteorological phenomena always coincident with earthquakes and volcanic action.] At a place twenty-six miles west from Bhooj, fire was seen in considerable



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volume to burst forth; a blazing ball was projected into the air and fell to the ground, where it was broken into four or five pieces, on which it became extinguished and invisible. No fragments could be discovered, but the vegetation was found scorched where it fell. On being examined next day, the hill was found rent and shattered, as if something within had sunk. Fire to a certain extent, was said to have issued from a bituminous hill from which alum is made, near Mru: the height of the hill was considered to have been reduced, and it was rent and shattered into ravines. Near the town of Sinderee, situated where a branch of the Indus joins the Runn, and which was permanently submerged on the occasion, a number of small cones, six or eight feet in height, burst up from the ground, and continued for many days to emit bubbles of air and mud from their summits. [McMurdo's account of the Earthquakes of Western India, 1819, Bombay Lit Trans, vol III p. 105.] The first and greatest shock occurred about seven p. m. on the 16th June: lesser shocks continued till the 20th, when the volcano called Denodour, about twenty miles N. W. of Bhooj, burst into action, and the movements of the earth immediately stopped. [Capt. Baird Smith on Indian Earthquakes. Bl. As Trans vol xii. June, 1843. The authority on which this statement is made is not stated.] Vestiges of recent outbursts, though of unknown date, appear at the village of Wage-ke Pudda. A high table land of volcanic matter, about two miles square, has been blown out into a flat basin, the sides being broken into fissures, with craters, ravines, and hollows; and the interior, or bed of the basin, interspersed with hillocks and cones of every variety of colour—black, red, yellow, and white, and with patches of cinders similar to the refuse of a furnace, the whole looking as fresh as if the igneous agents were still in operation. The surface of the table land immediately surrounding the blown out space is covered with burnt iron-stone, similar to septaria, divided into irregular cells. On other parts of the table land, craters of some fifteen or twenty feet in depth have been blown out: they are composed of the materials just described, and are covered with patches of sulphur. [Grants, Geology of Cutch. London Geol. Trans. 1838, p 316.]

The rocks around the hot springs of Peer Muggen, ten miles west of Kurrachee, consist of nummulite limestone, in some cases highly crystallised, and where the fossils, according to Captain Viccary, occasionally are extensively altered. Two miles further to the westward, occurs the group of Minora hills, about 800 feet above the sea, and 500 above the plain surrounding. On the eastern side a crater has been blown out,—the ruins are scattered around. It is oval in form, about 150 feet in length, and fifty across.

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The explosion has burst away one of the sides, and blown through the strata adjoining. It seems as if a vast deluge of water had for a short time been discharged from it; there is no tradition in existence regarding it, nor is anything known of the date when it was in action. It has clearly been subject to the great changes which have taken place around, though it is probable it preceded the deposit of the post pliocene clays found at its base, as these bear no appearance of disturbance, and have most likely been deposited by the sea subsequent to the explosion. There are several other craters of lesser size and more imperfect structure round Minora.

Capt. Carless, who gives (1838) by far the best account of this district yet published, speaks of a celebrated hill called Jibel Pubb, twenty miles N W. of the hot springs, of which wonderful stories are related all over the country, but he does not tell us what these stories are.

Capt. Viccary describes the clays as post pliocene. He makes no mention of the crater. I visited it and took careful drawings and measurements of it in March 1850. The highly crystalline states of the rock is conspicuous. I confess I could discover no evidence of any material diminution of its fossils around the springs or near the crater. The rocks, which everywhere around are one mass of shells and zoophytes, the corals being often in the most beautifully perfect state that can be imagined, have been in some places highly crystallised, the organic remains being in part obliterated. The crystals are occasionally arranged in beautiful star-like forms, like many members of the zeolite family.

The rocks at the Lukkee Pass—hot springs appear to be of exactly the same description as those at Peer Muggen—their position in all likelihood due to volcanic influences of comparatively recent existence. The hot springs of Peer Muggen attain a temperature of from 100 to 160, and yield a very copious discharge. The water is perfectly pure, and fertilises the soil around. The hot spring takes its name from Peer Muggen a Mahomedan Saint, whose shrine is close by. The coincidence of the sound with the designation given to the long snouted crocodile (muggur) has led to the inference that it was Peer Muggur, the Crocodile Saint. The crocodiles in the tank are of the kind called Gavial: they are precisely similar to those of the Nile and Ganges.] One of the tanks contains nearly 200 crocodiles; there is a spring at no great distance which affords large deposits of sea salt.

The next volcanic group to be met with in this direction is that of Hinglaj, a series of mud volcanoes, very similar in point of form to those of Chedooba, along the sea board of Lus, and now in great activity. Here there is no appearance whatever of there ever having been any eruption of lava. The first of these are called

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the koos of Chundra. They are believed to be of divine origin, and to be possessed of miraculous virtues.

Within two days' sail of the port of Kurrachee, within a hundred yards of the sea, commences the group of mud volcanoes known by the name of the Koops of Rajah Rama Chundra. Three of these were visited by Captain Hart; a fourth was seen by him at a distance, and they are said to be very numerous, and to extend some way along the shore, and far into the interior. About two miles from the wells of Tilook Pooree, three hills, of extremely light-coloured earth, rise abruptly from the plain. [Extracted from the Reports of the Society for May 1850]

The centre hill is conical, slightly flattened, and divided at the top: it is about 400 feet high: its southern and western sides are more precipitous than the others. The second of the group is about half the height of the first; the two are connected by a causeway about fifty yards in length. The third covers a greater area than either; its apex seems destroyed or broken off, otherwise the characteristics of the three closely resemble each other. They are all indented at the base with numerous chasms and fissures, which run into the interior, and their sides are stroked from the summit down as if with sluices of mud or water overflowing from the crater. A basin of liquid mud about thirty yards in diameter occupies the whole summit of the largest of the three. Air bubbles and jets of mud arise from the basin continually—the semi-fluid mass within being constantly disturbed by them. The whole summit of the hill is crusted over with caked mud. The same appearances almost exactly are presented by the craters of the two other hills,—with this difference, that in the case of one of them the mud was said to rise and fall, occasionally overflowing the crater, sometimes sinking in it above 15 feet. A fourth-hill, similar to those just described, was seen at some six miles off, but, 'was not visited. The water and mud all around is salt. The ground at the base of the hills is full of cracks and rents. It is the same volcanic agency, most probably, which gives rise to the hot springs of Peer Muggen, that supply the famous crocodile tank, which feeds or stimulates the mud volcanoes. Abundance of brimstone is found at no great distance, and one eminence some twelve miles off is known by the name of the sulphur mountain." Capt. Robertson describes the whole district, for an area of probably not less than 1600 square miles, from the Hara range westward as covered with mud cones, active or quiescent. He spent a fortnight amongst them in 1849 and could discover no particular day on which they were unusually affected: Captain Hart had been told that on Monday they were more active than they were on other days. "The native tradition regarding them is, that on the

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abduction of the Goddess Seeta by Rawun Sedas-hew, a form of Mahadeo was amongst others occupied in endeavouring to discover the place of her concealment. For twelve years he prosecuted his search unceasingly, but without effect. Worn out with exertion, and enraged at the fruitlessness of the task he had imposed on himself, he dashed his sacred cake on the ground. It broke into eighteen pieces and from every fragment a koop arose. The goddess instantly appeared, and chid his wrath and impieties, assuring him that through his wanderings she had accompanied him in the shape of a fly, which generally sat on his holy cake. In commemoration of his exertions on her behalf, she ordered that every pilgrim should pay his devotions to one of the koos before visiting her temple. The koos are called by the name of her husband Rama Chandra. On nearing the crater, the holy man who precedes the pilgrims continually cries out, Speak oh Rama Chandra!—and to their astonishment, accordingly they find on their arrival the mud at the top in a state of commotion,—evidence to them sufficient that the invocation has been listened to, and the deity is present." [Abridged from Capt. V. Hart's Pilgrimage to Highlaj, Bom. Geo. Trans. 1839, and Reports 1850, p. CVIII. A much more minute and copious account of the mud craters of Highlaj than that given by Capt. Hart is published in the 13th number of the Transactions of the Bom. Br. of the Roy. As. So. for 1850, written by Capt. Robertson of H. M S 8th, it confirms the perfect accuracy of Capt. Hart's account, as far as it goes.]

Turning back on the Indus, we find hot springs in the Lukkee Pass. The range of hills in this neighbourhood is composed of little ridges not exceeding 400 feet above the plain of the Indus, their apices with nearly horizontal strata, their sides abrupt and precipitous and non-nummulitic. The valleys, or intervening spaces between the hills, have been much disturbed. A variegated clay, abounding with gypsum, but containing no fossils, is of common occurrence. A brown, rust-coloured rock is abundantly distributed on the surface in the shape of rounded boulders, the most promising specimens of which are manufactured by the natives at Kotree into iron. Between this and the Indus are numerous low hillocks of aluminiferous clay, used for the manufacture of alum by the Seindees. The hot springs issue from the bottom, from what appears an external crater, of the same general character as those already described near Peer Muggen. There are here several hot springs near each other—they are all salt and sulphureous; the whole valley smells strongly of sulphuretted hydrogen gas, which rises in bubbles from the well, and a scum is constantly gathering on the water, which the natives remove and use as sulphur. Near one of the hot springs is



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an aperture in the rock three inches in diameter, from which, until of late years, a jet of flame used to issue; it was called the peri's fire by the natives, and is believed to have become extinguished on some infidel having bathed in the neighbouring well. [Abridged and slightly altered from Capt. Vicary's account of the Geology of Scinde—*London Geol. Trans.* 1846, Vol. III. p. 34.]

There is a very copious hot and sulphurous spring at Gurrumab (i. e. hot well, spelt Gurruma, Col. Campbell's map), in the Bolan Pass, about 200 miles to the northward. I am not aware of any between this and Lukhee.

The area of the volcanic field of Beila has never been precisely determined: it extends some fifty or sixty miles inland, and at least three times as much along shore.

The band, if band it be, now trends away southerly, from lat.  $22^{\circ}$  to lat.  $12^{\circ}$ , and the next group we meet in with, after a break of above 1000 miles, is that at the mouth and at the lower part of the Red Sea, commencing with Cape Aden, and concluding with Gibbel Teir extending across from the former of these to the Salt Lake Assal, inland from Tadjoura, and so on towards Shoa. [See Dr. Bird's Notes to Capt. Foster's Account of Cape Aden, *Bombay Geographical Trans.* 1840. Referred to in Report of the Society for 1850, Vol ix.] Aden is spoken of by Arab writers as having been in a state of activity within the historic period, and though there scarcely seems evidence sufficient of this to be relied on, and a very strong presumption to the contrary, it has all the appearance of great recency.

The volcano forms the terminal point of Southern Arabia, where the shore, after having inclined gently southward from Ras-el-Hudd.  $21^{\circ}$  N. Lat, at the entrance of the Persian Gulf to  $12^{\circ}$ , stretches almost due west, till it turns up the Red Sea. At no great distance of time it has obviously been an island, and is now connected with the mainland by a low sandy spit four miles long and half a mile across, only a few feet above high water mark: the whole shore indeed, consists of sandy down or salt swamps, only a little above the level, of the sea, and wearing the aspect of recent emergence. The peninsula itself is an irregular oval, five miles in its greater, and three in its lesser diameter. There are numerous little head-lands with sandy bays between all around it. There is at the head of each little bay, and on several points of the shore besides, a level expanse of rolled gravel and sea shells, evidently an old sea margin, brought to light by the same up-heaval that converted the island into a peninsula, and raised the isthmus above the level of the sea. The rocks themselves are all lavas of various descriptions, more or less vesicular, and the volcano affords a vast diversity of igneous minerals. There

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seem to have been from time to time a number of craters in the mountain, one of very considerable magnitude beyond the coal-depot betwixt Ras Morbut and Ras Far Shagan, having been blown outwards, and now remaining as a valley ascending from the sea. The edge of the principal crater is near the centre of the Peninsula. The crater itself occupies the eastern half. It is exceedingly well defined indeed, and at once indicates its origin to the spectator. It is about one and half a mile in diameter, and is nearly circular, affording a circuit of five miles. Of this half a mile has been blown out right down to the level of the sea. The bottom of the crater on which stands the town of Aden and the British Cantonments, is covered with a bed of rolled gravel and sea shells, proving that there has been no trace of eruption since the last general upheaval, which produced the sea beach all along these shores, but which is still believed to have been within the human, perhaps even the historic, period. [See Report of the Society of Civil Engineers May, 1851, copied into "Bombay Times," July 9. Also Miss Fanny Corbeaux's letters. *Athenæum* June 28, and July 5, 1851.] The Shum-Shum range, which forms about half the wall of the crater, reaches an altitude of above 1760 feet. There is a huge crack or slip which cuts above a third off the eastern side of the volcano, and through a portion of this, constituting a narrow gorge or pass, ten feet wide, and twenty or thirty high, the road from Steamer Point enters the crater, and leads to the cantonments. Dr. J. P. Malcolmson supposes this to have been the remains of the latest great eruption of which the effects are chiefly manifest on the table land on the eastern buttress of Sham-Shum: by this the ancient crater was shattered nearly through its centre from the northern to the southern pass breaking into pieces, and separating the whole of the eastern side of the edge of which Seera Island is a fragment,—and in these views I concur. (*Lond. As. Trans.* 1846) On the one side of this which remains the wall of the crater subsides from 1700 to 607 feet, and then breaks away altogether. The rift probably occurred when the side of the crater was blown out and demolished. The walls of the crater as now existing, when seen from the cantonments, present the most magnificent view that can be imagined: one semi-circular precipice, five miles in circuit, ascends some 1776 feet from the plain.

It is in most places perpendicular. The cliff is of a rusty dark brown colour, and full of caverns and recesses, carved almost like the altar screen of a Gothic cathedral. Great streams of lava may be observed from point to point, as if the fiery cataract had been arrested in its progress, and congealed as it flowed from the lesser rents of the principal crater. On many parts of the rock, 500 feet above the level of the sea,—to the

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level of Shum] Shum so far as I know, but the altitude just named is all to which I have examined,—great masses of volcanic ashes are strewed amongst the crevices of the rocks, these generally abounding, as does the surface all around, with sea shells in a state of great decay, to all appearance borne up by the volcano on its last emergence from the deep.

The minerals found at Aden are very numerous. We have almost every variety of lava, compact, earthy, vesicular, amygdaloidal, porphyritic, and obsidian in all its forms, from dull coarse green and bluish-green to beautiful jet black. Pumice is found, but is not plentiful. It is mostly of a dark reddish brown colour, and is heavier and more coarse in its texture than the mineral of commerce, and less suited for the finer purposes of the polisher. Brimstone is sometimes found, but rarely. Rock crystals in veins, nests, crusts, are very plentiful everywhere. On many parts of the volcano chalcedony in various forms abounds; in some cases it appears in thin crusts, in button shaped encrustations or in drops or studs, occasionally covered over with delicate rock crystals. They are of a beautiful bluish white, and take a prominent place in any cabinet. On these are occasionally found small crystals of purple fluor spar, from the size of a mustard seed to that of a sweet pea. Carbonate of lime appears as calcareous spar, frequently filling veins and cavities, as a slightly crystallised veined variety of marble of various tints of brown, exactly like the Gozo marble seen at Malta, and the portions of the Rock of Gibraltar from which ornaments are mostly cut. Sulphate of lime is found in veins in the form of beautiful fibrous gypsum, semi-transparent, and colourless. It also occurs in plates. Specimens of all the minerals here described, I have in abundance in my own cabinet—they have been mostly collected for me by Dr. Malcolmson, Mr. Mayers, and Mr. Adie, the duration of my own visits to Aden precluding me from procuring the rare minerals. [The following authors have been consulted in preparing these observations:—Bruce's Travels. Lands of the Bible by the Rev. Dr. Wilson, vol. I p. 9-25, names Description of Peninsula, Shores, and Climate. London Geog. Tran., vols. IX, and XV Salt's account of Travels. Medical Topography of, *Bombay Times*, January 16, 1839. Cor. Ind. Rev. vol. III. Bombay Med. Trans, p. 666. Ulcers. Dr. Campbell on, Ibid, reprinted Ind. Jour. of Med. and Phy Science. Foster, Bombay Engineers, Description of,—Bombay Geog. Trans, 1839. Description of, by Rev. Dr. Duff. Home and Foreign Missionary Record, 1840, *Bombay Times*, 1840 p. 467. Mignon, Lieut. Colonel, account of.—Almanac 1842. Aden Mr. F. Burr's account of, Lond. Geol. Trans. 1841, vol. VI. p. 80.—Bombay As. Trans. vol. I., p. 84 Ind. Rev., vol. 6, 1842 Malcolmson Dr. Geology of London Trans.

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Ancient Inscription found at, See Haines Account of Quicksilver found at,—*Bombay Times*, 1843. Dr. Arbuckle's Report on Bombay Geo. Trans. vol. I. p. 302. Lieut. Wellsted's Memoir on the coast N. of p. 19 Aden. M. D'bbæ's account of p. 12. Buist, Dr. on specimens of lava from—Bombay As. Trans. vol. I. p. 345 size of, compared with Ætna. Remarkable currents in Gulf of, betwixt to Arabian African shores, Haines in Lond. Geog. Trans. 1848.—supposed to arise from the influence of the winds, or variation in the character of the water in the Red Sea. Discovery of Fluor Spar in lava of, Dr. Girandon.] Right across the bay to the eastward, at a distance of five miles are the magnificent remains of another crater, called Gibbel Hassan. It is nearly the same size and form as Aden, but rests on the mainland. The centre peak attains an altitude of 1237 feet, and on sailing round in certain aspects it presents the appearance of a stupendous Gothic cathedral; two peaks of 700 feet, close beside each other, have obtained the very unpicturesque name of the Asses' Ears, from the appearance presented by them far out at sea: seven miles beyond this, and seventeen from Aden, another fragment of a cone of smaller size, but considerable beauty, rises up to the altitude of 700 feet and projects about three miles into the sea, while half-way betwixt this and the Straits, Gibbel Kurrus or St. Antony, apparently a volcano, reaches an elevation of 1772 feet—Barren Peak and the high range of Gibbel Arrar, or the Chimney Peaks just opposite the Strait, being all set down by the surveyors as hills of volcanic origin. [The whole of this information is taken from the Charts and survey Notices of 1836-40. Aden is the only volcano I have myself examined—the others, I have merely seen from sea. They have all the appearance of being correctly described, and considering the ability of the surveyors, I have no doubt that they are so]

The range from this bends northward, and follows the line of the Red Sea shore.

From Aden to Babelmandel, indeed, the rocks along the Arabian shore seem to be wholly volcanic for a distance of above 100 miles. On the African shore a singular cove at the upper end of the Bay of Tadjoura, called Joobul Khareb, seems the crater of an old volcano; it is connected with the Bay of Tadjoura by two narrow channels the whole width across from coast to coast being about three quarters of a mile, with a small island near the middle. One of the channels is forty yards wide, with sixteen fathoms water, the other 250, with three fathoms. The cove inside is about thirteen miles in diameter, by six—the western portion is volcanic. At its extremity is a basin, or crater, 300 yards in diameter, surrounded by precipitous volcanic cliffs through which the sea makes its way to the water inside, the entrance is dry at low water.



Lava and scoriae abound everywhere around. [Capt. Barker's paper. Lond. Royal Geograph. Trans. 1848.] The waters of the cove are said occasionally to be violently agitated and disturbed without apparent cause, probably by the emission of gas from below [Harris, Highlands of Ethiopia. vol. I. p. 17.] The volcano being scarcely yet asleep. Off the outer bay, the hills are of limestone, and rise to the height of 2000 feet.

The rocks around the salt lake Assal, whose waters are now nearly dried up and encrusted with salt, are all volcanic on the eastern side. A bed of lava, containing several deep fissures, separates the waters of the lake from those at Gubatel Kherab, of which it appears to have been a continuation. [Dr. Kirk's Journey from Tadjoura Ankobar, 1841. Geolog. Trans. 1841. vol. X. The paragraph is given verbatim. Ibid, and more extended, Bombay Geogr. Trans. vol. VI, 1841 to 1846.] The lake is  $11^{\circ}38'12''$  N. and  $42^{\circ}30'6''$  E., it is about seven miles across in its larger diameter, and 570 feet below the level of the Sea. For about 300 miles westward into the interior the whole country seems volcanic.

To the south-westward of this near Shoa, is the volcano of Gibbel Abida, about 4000 feet high, its crater opening to the N. W., and about two and half miles in diameter, and further on the still higher peak of Aiullo. Here there is an even plain about thirty miles in diameter, studded with small cones, of which as many as twenty may be counted at once, each exhibiting a distinct and well found crater. The lava everywhere around is fresh and glossy but no tradition exists of any eruption having occurred within the memory of man.

Returning to the Straits of Babelmandel, we find the volcanic peaks of the High Brothers, just outside the gut, on the African shores. The Island of Perim, which occupies a portion of the Straits near the Arabian side, with the Babelmandel Peak on the mainland close by are masses of lava. Along the African shore, from lat.  $11^{\circ}$  to lat.  $14^{\circ}$  and from long,  $42^{\circ}$  to Long  $44^{\circ}$  the series of volcanoes is uninterrupted for the space of 400 miles running into the interior about  $10^{\circ}$  N. towards Ankobar, long  $40^{\circ}$  E. [Dr. Kirke, ut sup.] How far the volcanic district extends into the interior along the African shore within the Straits of Babelmandel does not appear—a range of hills above fourteen miles from the sea to which it is nearly parallel is set down on the chart as mostly volcanic: there is a second chain of very high mountains parallel to this again, about fifty miles further to the west, but its character does not appear to have been ascertained.

On the Arabian shore from lat.  $30^{\circ}$  to lat.  $15^{\circ}40'$  for a distance of nearly 200 miles a range of hills of volcanic origin is set down on the map about twenty miles

from the shore, with a second range behind them, like that on the African side undescribed. The lower range is a continuation of the Aden volcanoes; thus extending in a continuous line for above 300 miles along shore. There can be no reasonable doubt that the whole basin of the Red Sea,—here about 100 miles across,—from the Arabian to the African chain of peaks, is volcanic, studded as the intermediate channel is with cones now in a state of activity so that the *ascertained* area of this region from Aden to near Ankobar, and from this to Gibbel Teir is about 350 from E. to W. and 450 from S. to N. Within the channel of the Red Sea the most conspicuous peaks are the Harnish Islands, and Gibbel Goo-gur, betwixt lat  $13^{\circ}40'$  and  $14^{\circ}$ , the Zebeyar Islands in lat.  $15^{\circ}$  and Gibbel Teir in lat.  $15^{\circ}30'$ . A violent eruption of short continuance occurred in the Zebeyar Islands on the 6th August 1846. Gibbel Teir has for nearly a century been known to be in a state of constant activity. It was visited by Bruce in 1774; it then gave out smoke, and was said occasionally to emit flame and stones; he describes the masses of lava as having shells embedded in them, a circumstance that has not, so far as I have observed, been noticed by any other traveller. [See Travels, quoted in Geographical Society's Report for 1850.] It was visited by Capt. Elman when engaged in survey in 1838. [I have taken Dr. Kirk's description, slightly abridged.] And by Dr. Kirk in 1841. The island is circular about seven and a half miles round. [Dr. Kirk makes 300, Bruce 500; in the survey charts it is set down at 900.] Resembling on being approached, a hill of considerable elevation rising from a plain terminating in a bluff steep on the eastern extremity. The summit of the hill is about 300 feet above the sea level.—there are no soundings close in shore, at  $150^{\circ}$  fathoms, so that the visible portion is merely the summit of a hill the base of which is hid by the water in all probability 1,109 feet high, or 1,900, if the altitude of 900 assigned it by the chart be correct. The whole surface is covered with ashes, lava, and cinders; near the summit there are about fifteen small open craters, from several of which steam and hot air are continually issuing and occasionally smoke. Streams of indurated lava are seen to proceed from these chiefly towards the east side of the island. It is said to have been on fire about 1828 or 1830. One of the peaks in which it terminates exhibits the remains of two craters of about twenty five feet in diameter—both have fallen in: a single crater of much more recent formation than the others appears in the Northern peak of Gibbel Teir, it seems the northernmost of the volcanoes in the Red Sea, and probably limits the band.

We have no information whatever, so far as I know, as to any volcanoes in the interior of Arabia, or to the Northward. An extinct volcano,

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called Mount Nimrod, is described by Mr. Chancourtois. [Report of the Academy of Sciences 17th Nov. 1845.—Ibid. Edinburgh Philosophical Journal, April 1846. p. 377, as existing near the Salt Lake Van in Armenistan, on the frontiers of Persia, between the 38th and 39th degrees of latitude. On the banks of the Euphrates, near the city of Hit, in the region of the Petroleum Wells, Dr. Winchester found scoria on the summit of a detached hill about eighty feet above the level of the plain; no other volcanic appearances was observed. [Bombay Geographical Transaction, vol. II. p. 30.]

The following, on the supposed burying of great cities in Central India, is extracted from the 8vo. edition of "Lyell's Principles of Geology, 1832"—it is transferred unaltered to the edition of 1851:—

"We remarked in a former volume, that in many countries which have been peopled from remote ages by civilized nations, and have been at the same time the theatre of volcanic action, there must be innumerable monuments of the highest value to the historian, which continue unobserved 'because they have not been searched for.' But we omitted to describe in detail a splendid example of several buried cities in Central India, which might probably be made to yield a richer harvest to the antiquary than Pompeii or Herculaneum. [Ibid. p. 407.] The city of Oujein (or Oojain) was, about fifty years before the Christian era, the seat of empire, of art, and of learning, but in the time of the Rajah Vicramaditya, it was overwhelmed, together, as tradition reports, with more than eighty other large towns in the provinces of Malwa and Bagur, 'by a shower of earth.' The city which now bears the name is situated a mile to the southward of the ancient town. On digging on the spot where the latter is supposed to have stood, to the depth of fifteen or eighteen feet, there are frequently discovered, says Mr. Hunter, entire brick walls, pillars of stone, and pieces of wood of an extraordinary hardness, besides utensils of various kinds, and ancient coins. Many coins are also found in the channels cut by the periodical rains, or in the beds of torrents-into which they have been washed. "During our stay at Oujein, a large quantity of wheat was found by a man digging for bricks. It was, as might have been expected, almost entirely consumed, and in a state resembling charcoal. In a ravine cut by the rains, from which several stonepillars had been dug, I saw a space from twelve to fifteen feet long and seven or eight feet high, composed of earthen vessels, broken and closely compacted together. It was conjectured, with great appearance of probability to have been a potter's kiln. Between this place and the new town is a hollow, in which tradition says, the river Sipparah formerly ran. It changed its course at the time the city was buried, and

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now runs to the westward. [Narrative of a Journey from Agra to Oujein, Asiatic Researches, vol VI. p. 36.] The soil which covers Oujein is described as being of an ash grey colour, with minute specks of black sand [Asiatic Journal, vol. IX. p. 35.

"That the shower of earth which is reported to have fallen from heaven, was produced by a volcanic eruption, we cannot doubt, although no information has been obtained respecting the site of the vent and the nearest volcano of which we read, is that which was in eruption during the Cutch earthquake in 1819, at the distance of about thirty miles from Bhooj, the capital of Cutch, and at least three hundred geographical miles from Oujein.

"Captain F. Dangerfield, who accompanied Sir John Malcolm in his late expedition into Central India, states that the river Nerbuddah, in Malwa, has its channel excavated through columnar basalt, on which rest beds of marl impregnated with salt. The upper of these beds is of a light colour, and from thirty to forty feet thick, and rests horizontally on the lower bed, which is of a reddish colour. Both appear from the description to be tuffs composed of the materials of volcanic ejections, and forming a covering from sixty to seventy feet deep overlying the basalt, which seems to resemble some of the currents of prismatic lava in Auvergne and the Vivarais. Near the middle of this tufaceous mass, and therefore at the depth of thirty feet or more from the surface, just where the two beds of tuff meet, Captain Dangerfield was shown, near the city of Mhysir, buried bricks and large earthen vessels, said to have belonged to the ancient city of Mhysir, destroyed by the catastrophe of Oujein." [Sir J. Malcolm's Cent. Ind.—Geol. of Malwa by Captain F. Dangerfield. App. No. II. pp. 324.] Lyell's Principles of Geology, 1832. pp. 237-38.

I have not had it in my power to visit or examine this part of India, and can only speak of it on the authority of others. I am from this strongly inclined to believe, that the tradition of the shower of earth is wholly fanciful, and that the assumption of the submergence of the cities in Central India wants conformation. It is quite clear from the expressions made use of, that both Capt. Dangerfield and Sir John Malcolm speak mainly on the authority of Mr. Hunter: the latter writes with the utmost hesitation, and both at best are but hearsay witnesses. The following are the words of Capt. Dangerfield in reference to Mhysir, from which it will be at once seen that he believed the earthy mass on the banks of the Nerbudda alluvial, not volcanic.

"At present there is no appearance of volcanic matters, though some of the hills, both in the Vindhya range and in the neighbouring wild tract of Raisenly, are said to have hollows some-



times filled with water, near their summits, which have been thought to resemble extinct craters. These I have never seen, and cannot, therefore, hazard an opinion. Earthquakes appear to be, to the Northwest, of frequent occurrence, and, if we may judge from the recent one which nearly overwhelmed the province of Cutch, often very severe. These soils are sandy, and with their saline ingredients appear, however, naturally enough to be derived from the decomposition of the rocks composing the neighbouring mountains, and which each rainy season, with the violence peculiar to India, would bring down and deposit in great abundance. But how the two strata have acquired their relative position and marked line of separation, it is here unnecessary to surmise or inquire."—(App., No. II, to Sir J. Malcolm's Memoir of Central India, p. 325.)

Conolly, on the other hand, speaks from careful and minute personal observation, he being one of the most exact and observant writers of his time. There are others who write to exactly the same effect with Conolly, though I am not at present able to cite them. It is a sad reproach to our Government that with such abundance of men of talent and research at their disposal, facts so interesting and important as these should remain in dubiety: even the Neapolitan government charges itself with the investigation of the antiquities of Herculaneum and Pompeii.

"The theories which account for the change of site of Oujein appear to me all equally unsatisfactory. I neither believe with Hunter that a shower of earth nor with Malcolm that a flood, overwhelmed the old city, nor with the natives that it was turned topsy turvy. The tales of old bricks, and of wood of surprising hardness, &c. dug up at depths of fifteen feet seem to smack of the Oujein failing of exaggeration. Several people were interrogated who had been twenty and thirty years at the place, none of them had ever positively seen such things though all believed most religiously both these and much more wonderful curiosities to be found. It is currently told, that a chamber was discovered in which was seated the skin of a beautiful lady just, explained my informant, like the shape of a grasshopper which you see trembling on a stalk of grass in the dry weather. Some incautious visitor approached too near the delicate shell, it vanished into air—like the fish found in the pyramids,—*comme-de la pousiere quis' envole quand au souffle dessus.*' Bricks found at any depth would prove little, for they might have belonged to walls which stood on the slope of a hollow, filled up by time; many of the houses of the present town being built in this fashion to save the trouble of making a back wall, or they might have belonged to under ground granaries *tahkhanehs*, or wells. A shower not exactly like the famed one of bricks and tiles, [Phiny, where the date is gravely given.] but one equally composed of

building materials, such as rained, says Assemani, in 769, 'Une pluie de pierres noires; seems as likely to have fallen here, as earth or sand.

"The surface of the hill (of the old city) where it has not been ploughed and picked is strewn with fragments of stone, just as you would expect in a place which had once been covered with houses: these broken pieces of trap being parts of walls of which the larger companions have been taken away as materials for other buildings.

"The theory of an inundation is principally supported by a tradition that the river has changed its bed. This belief seems to me a native fabrication to account for a square, tall, brick building, which resembles the wells so frequently found near the banks of the river. It is situated in a hollow, through which the river is said formerly to have flowed, and which is perhaps merely the dried up channel of some nullah. Of the name of the well Bibi Mako I could get no more satisfactory explanation than that the words are convenient for the repetition of the echo. Every little idle urchin runs into the square and bawls out Bibi Mako with a drawl on the O, and is equally frightened and delighted with the reply of Bibi Mako. One argument is conclusive against an inundation: that the hills on which stood the old city are higher ground than the level of the present town, and that the latter is the more likely also to be overflowed. Indeed no such extravagant theories are required to account for the desertion of the first occupied spot. The whim of the reigning prince is sufficient to determine the position of any oriental town, of which we cannot look around without observing instances, as at Delhi, Lucknow, Maheswar, &c. And that coins and antiques should be picked up is not a whit more extraordinary than the annual harvest of such curiosities at Begharm and Canouj, &c., towns, the last of which at least, was gradually deserted.

"Romance lovers would be shocked at my theory of the origin of the so-called raja Bhirtri caves. The natives are in the habit of excavating the foot of the hills of the old city for an excellent clay of which there is a thick and extensive bed. Any one who has resided at Delhi will remember the excavations there for the same purpose, which have not unfrequently been converted into agreeable *tahkhanehs*. One of those of Oujein nearly rivals in extent Bhirtri's retreat, is supported by arches cut out of the clay and is divided into several chambers. Such was probably the origin of the great caves, which are very low, and not of any great extent. [The dimensions may be seen in Hunter.] They are supported by pillars, clumsy, but massive, and the walls and ceilings are lined with enormous blocks of stone calculated, it might be thought

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"to fatigue time." But they will shortly be crushed by their own weight; already one room has fallen in, and some of the slabs are in such a position that at first sight it does not seem safe to walk under them. What may have been the primary object of the buildings is matter of question. The natives contend that it was raja Bhirtri's hermitage, but their own fables refute them, for we read that the raja immediately after swallowing the amar phal set out on his travels. In no place did he allow his weary limbs long to rest, though he halted at Sehuan on the Indus, at Bhartewar near Khyroda, at Chunar and Benares, and to this day he is believed to be still wandering about, among the Hyperboreans beyond the Himalayas. A late writer, [The author of the paper before alluded to in the E. I. United Service Journal,] imagines it to have been the dwelling place of raja Bhirtri. There is, however, no appearance of its having been built to live in. Bhirtri, would have run the risk of breaking his head or his shins every time he rose up, or walked, in his low roofed unevenly floored mansion. The caves seem by their position to be exposed to inundation, which alone would have unfitted them for houses, and may have been the cause of their having been solidly built. An outer court, though very strongly constructed has been partly thrown down apparently by the swell of the river. The pillars too are sculptured on only three sides, that side which faces the wall, and which would not be seen by one passing through the caves, not having been even smoothly chiselled.

According to Colebrooke's theory, which however seems to have now but few followers, "the antiquity of the caves will be much lessened, if from the first they were furnished in the same fashion as the present, for they are now evidently ling temples. The figures on the pillars, are small, much defaced, and were originally far from being deeply carved, but there is no difficulty in recognizing them for those indecent groups which mark the temples of Siva. Several lings are scattered about, though one only seems to be worshipped at Kedareswar, 'lord of cedars.' Marks of feet engraved on the rock are not unfrequent. At the end of the left cave on a slab of black stone about three feet high, one broad, two figures (one over the other), are cut, sitting cross-legged, performing topasya. The upper one is called Gorakhnath, the lower, his pupil Bhirtri. "Near the entrance lies a huge head of a Rakeshasa, and the ghat below takes its name from a gigantic stone image of Kapila muni which leans against the bank half buried in sand."

"The quantity of antiques collected amongst the ruins of Indian cities has always seemed to me a subject of wonder. The supply from old Oujein is so constant and plentiful that the natives call the place by the appropriate name of

## VULPES FERRILATUS.

Rozaka Sâdabirtâ, and it is in truth a never failing charity for the industrious poor. In the idle days of the rains the digging begins. The principal things found are glass, stone, and wooden beads, small jewels of little value, seals, (agate and cornelian,) and a few women's ornaments; copper coins are numerous, next in number are the debased silver Guzerati ones. Pure silver rupees seem scarce, and gold mohurs are either secreted and melted when found, or they but rarely reward the searcher, for I was only able to procure one, and that a doubtful specimen. As the pilgrims carry away with them as relics, what has been dug out of the Jungarh, the merchants mix with the real antiques every old bead or piece of copper which has an ancient look, and pass them off as genuine on the unsuspecting natives. One man brought a large heap of copper seals or plates of chaprasas which had engraved on them modern Musalman and Mahratta names, and was ready to take his oath that they had been dug up, which perhaps they were, for he had probably buried them that they might have the appearance at least of age. Steatite 'Nadalis' are also frequently brought for sale, some of them as old looking as if they had really been buried with the city." —*Journal of the Asiatic Society of Bengal*, p.p. 851-54.

Dr. Buist in Trans. Of The Bomb. Geogra. Soci. Pages from 139 to 767.

(2955) VOLCANO OF TAEI is in the island of Luconia in Manilla. The island is formed by a mountain from three hundred and fifty to four hundred yards above the level of the Laguna de Bombon, is about three leagues in circumference and has a crater about 2 miles at its circumference on its summit. The lining walls of the interior are fifty to seventy five yards in perpendicular height and five cones of eruption covered with sulphur rise from the centre of the crater, a lake of green water which boils in several places. The Laguna de Bombon, itself has a circumference of thirty leagues; its waters are brackish and bituminous, and of great depth, in some parts no soundings at 125 fathoms. The great eruptions occurred in the years 1716, 1746, & 1754. —*Elder's Biography of Dr. Elisha Kent Kane*, 1858.

(2956) VRITRA, otherwise called Ahi, in Hindu mythology, the personification of the rain-cloud; with whom Indra, the lord of thunder had a contest. —*Thomas' Prinsep's, Antiquities*.

(2957) VULPES BENGALENSIS, (Shaw): *Canis Kokree*, Sykes: *C. rufescens*, *V. chrysurus*, et *V. xanthurus*, Gray: *V. corsac* apud Ogilby. India generally, but not Ceylon.

(2958) VULPES FERRILATUS, Hodgson. Tibet. Lt. Speke, of the 46th N. I. informed Mr. Bligh that he is familiar with three species of Foxes in Tibet: two of which he identified in the



## VULPES LEUCOPUS.

Museum with Nos. 1 and 7, and the third he stated to be more like No. 6;—doubtless, therefore, the true *corsac* of Pallas, which according to Dr. J. E. Gray “is very similar to *V. Bengalensis*, but differs in having no grey collar round the front of the chest.”

(2959) *VULPES GRIFFITHII*, Bligh, *n. s.* The ordinary small Fox of Afghanistan (vide *J. A. S.* XIX, 344). Size of last, or larger than *V. Leucopus*, with longer fur, and the pale parts tinged with yellowish fulvescent.

(2960) *VULPES LEUCOPUS*, Bligh *supra*. The small desert Fox of W. India. The small desert Fox with white-tipped brush (*Vulpes Leucopus*, Bligh, XXIII, 729), is common in the neighbourhood of Hansi during the cold weather only, and very rarely seen there at other seasons.—*Journal Beng. Asiatic Society*, No. V of 1856. It is a typical *Vulpes* which *V. Bengalensis* is not; of the size of *Bengalensis*, or smaller than *Pusillus*.

This little Fox pertains to a species hitherto undescribed and merely vaguely indicated, which I have long sought to verify.

The Honorable Mountstuart Elphinstone remarks of the Foxes of the great Hurriana desert, that these “are less than the English Fox, but somewhat larger than the common one of India: their backs are of the same brownish colour with the latter; but in one part of the desert, their legs and belly up to a certain height, are black, and in another, white. The line between those colours and the brown is so distinctly marked, that the one kind seems as if it had been wading up to the belly in ink, and the other in white-wash.” (*Account of Cabul*, &c, p. 7) Mr. Walter Elliot would not appear to have discriminated this small Fox of W. India from *V. Bengalensis*; further than by the observation, that—“It is remarkable that though the brush is generally tipped with black, a white one is occasionally found, while in other parts of India, as in Cutch, the tip is always white.” (*Madr. Journ.* X, 102.) We have little doubt that Mr. Elliot’s supposed variety of *V. Bengalensis* with white-tipped tail, refers to the present species: but Mr. Griffith’s smaller Fox of Afghanistan (*J. A. S.* x, 978,) is different, and so we now consider Mr. Theobald’s small Fox of the Punjab salt range (*J. A. S.* xxii,

## VUTTA THAMARY.

531,) to be, and this may bear the appellation *V. Pusillus*. The small desert Fox of W. India may be designated *V. Lencopus*.

The following is the series of Indian and Tibetan Foxes now in the Museum of the Society.

(2961) *VULPES MONTANUS*, Pearson: *V. himalaicus*, Ogilby. Like the British *V. Vulgaris*, but always much less rufous, paler and more hoary; specimens varying, however, a good deal in colour. Common in the N. W. Himalaya, as about Simla and Masuri; and the larger Fox of Afghanistan was thought to be identical with it by the late Mr. Griffith.

(2962) *VULPES NIPALENSIS* (et *flavescent*), Gray: *V. montanus* apud Hodgson, *passim*. Described *J. A. S.* XI, 589. The common large Fox of Tibet, rarer S. of the snows, and believed by Mr. Hodgson to be *V. Montanus* until we shewed him the identical specimen upon which the latter was founded by the late Mr. Pearson. In Dr. Gray’s printed catalogue of the specimens presented by Mr. Hodgson to the British Museum, *V. Montanus* apud Hodgson is identified with *V. Flavescent*, Gray; but it differs much from the small Afghanistan Fox which we have hitherto referred to *V. Flavescent* (vide *J. A. S.* XIV, 314). This handsome species is of the size of *V. Vulgaris* and *V. Montanus*, but has much finer, longer, and denser fur, of a prevailing bright light yellowish fulvous colour, with correspondingly superb brush, and the black ears strongly contrasting. The Society’s specimens are from beyond the snows.

(2963) *VULPES PUSILLUS*, Bligh. The small Fox of the Punjab Salt Range. Nearly resembles the last, except in being a much smaller animal.

(2964) *VUTTA THAMARY*. A simple pure gum of a crimson colour from Travancore: it has been used for taking impressions of leaves, coins, medallions, &c. Specimens of the transparent castings are forwarded; when the gum is pure and carefully prepared the impressions are as sharp as those of sulphur, without its brittleness—also a twig of the tree, which has been identified as *Macaranga Indica*, the exudation so far as known is an entirely unknown production.—*M. E.* of 1857.

## W.

(2965) WANDEROO MONKEY, *Macacus silenus*.

(2966) WAX, VEGETABLE. This term has recently been applied to solidified oils. Mr. Edward Loarer lately discovered a mode of fabricating, so as to become a mercantile product, a substance which until that time had been of no commercial value. This substance he named vegetable wax, from its resemblance to that animal product, and he obtained a Patent for it under Act VI of 1856 of the Government of India.

Since then, he has manufactured about 200 tons of that material, all of which has been sold, in Madras, Calcutta, and Europe; it has brought various prices, but the latest selling price at Havre was about £43 per ton of one thousand kilogrammes, or 2,200 English pounds. The Patent Act of 1856, was repealed by Act IX of 1857, and his Patent rights fell into abeyance, but under Art. 35th of the new Act, these have been recovered by him and the right of manufacturing and selling the product, again became his own.

Candles can be prepared of the same material; and advices from Bordeaux shew that the power of bleaching it is possessed in Europe. The vegetable wax is made from the common lamp oil (castor oil) of the country, the plant producing which, is grown throughout the length and breadth of the Indian Empire, springing luxuriantly even on bare rocky soils, affording, therefore, exhaustless supplies of the raw material for the wax.

During 1856 and 1857, Mr. Loarer's success in the manufacture and sale of the vegetable wax was so great, that he almost acquired a modest competency, and thinking the knowledge how to manufacture this product, if widely spread would add one more source of profit to the people, he offered to impart all his knowledge and dispose of all his exclusive rights for the sum of Rupees 5000 undertaking to teach for the next three months and fully instruct any number of servants or subjects of the State. This offer was for the twenty-two Civil Districts of the Madras Presidency, only, reserving for his own benefit the new Patent Act in the other parts of the Indian Empire.

Before coming to any decision on the subject, the Government in Extract from the Minutes of Consultation in the Public Department, dated 24th August 1858, No. 1057, resolved to refer Mr. Loarer's offer for the opinion of a Committee composed of the following Officers, viz., Colonel A. McCALLY, Colonel G. BALFOUR, C.

B. Lieutenant Colonel F. C. COTTON, J. E. MAYER, Esq.

This Committee was constituted for reporting on the produce and resources of India, and satisfied themselves by enquiry, that, excepting in connection with Mr. Loarer, vegetable wax had not hitherto been found amongst the Indian exports as an article of commerce, nor entered among the lists of exports from any part of India; and that in the solidified form in which presented by Mr. Loarer, it may therefore be considered a new article of India trade.

The filed specification held by Mr. Loarer, sets forth several processes for converting certain oils into a solid substance, named vegetable wax; but the Committee tested two processes, by causing experiments to be made on the limited scale to which chemical book accounts apply, and on the extensive, simple, and economical scale, which Mr. Loarer considers peculiarly valuable in his processes.

In the experiments both of Mr. Loarer and Mr. Norton the former produced vegetable wax with great economy in the use of the chemical ingredients, and employed them in such a mode as to satisfy the Committee by a careful calculation of the cost of the conversion, that Mr. Loarer's process is of a far more economical nature than that described in Chemical works, as the following comparative calculation will shew.

In experiments 1, 3 and 4 by Mr. Norton the quantity of nitric acid used, was one twentieth part of the oil experimented upon; at which rate the cost of manufacturing ten tons of vegetable wax would be as below: 22,400 lbs. of oil would require 5 per cent of nitric acid viz., 1,120 lbs.

	RS.	A	P.
1,120 lbs. of nitric acid @ 1 Rupee a pound,.....	1,120	0	0
Coolies for stirring.....	1	0	0
Cost for ten tons,.....	1,121	0	0
For one ton,.....	112	1	6
But by Mr. Loarer's process No. 1, the cost is per ton only,...	4	4	0
And by process No. 2, is only	1	11	3

Mr. Loarer's experiments in presence of the Committee were on a scale so large as to enable them to report with confidence as to their successful application to any quantity, and doubtless with yet more economy if on a very extensive scale.

By one of Mr. Loarer's processes, extremely simple, about 100 lbs. of oil were congealed in 8 hours; only one ingredient (sulphuric acid), in



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any way difficult to procure in the country, was used, and that only in very small quantity sixteen ounces sufficing for obtaining 100 lbs. of vegetable wax. This process is admirably adapted to the country and may be adopted by the ryots without any difficulty; for although sulphuric acid cannot be manufactured at present in the interior, it is cheaply prepared at the Madras Mint (at 2 Annas per lb.) and is not difficult of carriage.

The next process, in which both nitric and sulphuric acids are used, is the best adapted for manufacture on a large scale; by this process 400 lbs. of oil were congealed in a wooden trough in 4 days, and Mr. Loarer has suggested an arrangement, and described an apparatus, which would make this process of preparing vegetable wax on any scale, very simple.

The Committee had therefore no hesitation in reporting that the manufacture of vegetable wax can be generally introduced into this country; thus enabling the grower of Castor and other similar Oil Seeds to carry oil to market in a solid and consequently more portable state: and with the diminished cost of carriage, the growers from the interior might advantageously sell their produce on the Coast, or export it to foreign countries, whereas at present the carriage of fluid oils is not only difficult, but costly.

The vegetable wax may be applied to several uses and when this product is fairly tried and introduced into England, it will take its place there amongst the most valuable imports.

Any new oily substance so economically manufactured as the vegetable wax, is sure to be applied to many important uses; and as it will undoubtedly compete, successfully as regards cost, with the cheapest oil or fat now employed in England, there can be no doubt as to the result. Even in India, Mr. Loarer has made a considerable profit upon the vegetable wax, having sold some to the Madras Railway for use, and some to other parties for export to Europe; and the Committee have no doubt that with the great reduction in price which Mr. Loarer anticipates being able to make, the article will speedily overcome temporary objections.

The Lamp oil and Castor oil seed plant is grown in all parts of the country and on the poorest soils, the arid nature of the country, and the climate of Southern India being particularly suitable for its growth; and Mr. Loarer's cheap process of converting the oil into wax, will, by enabling the Ryot to store the solid substance far more easily than the seed or fluid oil, lead to the oil being expressed from the seed whilst clear and free from impurities: and its utility being thus increased, the export of vegetable wax will probably increase as rapidly as did that of gingely oil seed, when the fact was once established, that the oil it yields was applicable to the same purposes as olive oil.

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The vegetable wax has the advantage of being easily stored, and transported from the interior on the rudest conveyance and in the simplest and cheapest form; it can be loaded upon carts, on bullocks, or in any way best adapted to the habits of the people, and sufficiently protected from injury and from weather by the ordinary leaves and mats of the country, requiring neither casks, dubbers, nor boxes to convey it. It can further be solidified into any portions or shapes, and on board ship can be stowed in any convenient corner; requiring no protection against leakage or bilge water, and by its nature it can be packed so close, that no danger from shifting of cargo or injury to the article from rubbing, need be apprehended.

The Ordnance and Public Works Departments, in this country will readily find many uses to which the article can be applied, and doubtless practical experience and time will extend these uses. The Railway Authorities have already purchased the vegetable wax to a considerable extent for lubricating; and when once the sale is open, the price of the article will be very low, and the Officers of the Railway will be enabled, by mixing with it other substances, to render it suitable for the purpose of grease, at a very small cost. The recipes for preparing the Railway grease employed in England and in Belgium, require soda water, oil, and suet or tallow, combined in certain proportions; whereas Loarer's vegetable wax if used as the lubricating agent to form the main ingredient in the composition would, at the rate at which it could be purchased in an open market, allow of a considerable saving in the present outlay for grease for Railways; and at the same time, an article would be obtained, which the experienced Manager of the Rail considers to be superior to all other mixtures as a lubricate. The consumption of tallow and fat in the Madras Ordnance Department in the year 1857-58 was 10,772 lbs. at an outlay of Rupees 3,989; and taking the highest price of oil, viz., 60 Rupees per Candy of 500 lbs., the price of the above quantity of tallow and fat is about three times the cost at which an equal weight of vegetable wax can be prepared by Mr. Loarer's process; and if used for only some of the purposes to which fat is now applied, a considerable saving would be effected by the introduction of this substance. The large consumption of grease at the Railway would also give a considerable margin, in favor of the vegetable wax.

Looking to the extensive benefit to be derived by the people of the country from a knowledge of this mode of obtaining vegetable wax, by bringing into practical and extensive demand the most common article of produce in this country, (oil) the cost of which will by Mr. Loarer's discovery be diminished in various ways, and considering the vast pecuniary interest the Govern-

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ment of this Presidency has in the extension of cultivation and the increase of useful exportable articles, by reason of the direct revenue drawn by Government from the lands of the country, the Committee recommended the sum of rupees 5,000 to be paid down to Mr. Loarer, and Rupees 5,000 more to be paid on 500 tons of vegetable wax being exported; The Committee recommended further, that it at any time within 20 years, 5,000 tons of castor or other oil in a solidified form be in any year exported from the ports of Madras, an additional sum of Rupees 5,000 be granted to Mr. Loarer, or his heirs.

Mr. Loarer gives the following accurate details of three different processes for the manufacture of vegetable wax.

### 1ST PROCESS.

This is the cheapest of all, and is well adapted for villagers and ryots. A common earthen pot being the only apparatus necessary.

Take one part of common unrefined Saltpetre, and one part of Sulphuric acid: mix these at the bottom of a pot of sufficient size, and as soon as the mixture is well saturated, a hundredth part of common Castor oil is to be slowly poured upon the mixture, and the whole heated on a slow fire until it reaches a temperature of  $\frac{2}{3}$  that of boiling water or about 160° Faht. (more or less is not the question provided the oil does not boil). The means for ascertaining the temperature of the oil is with the finger, being careful to stop the fire so soon as the heat will not allow to keep the finger into the oil: the compound is then allowed to cool and may be then decanted into another pot or box made water-tight and it is then well stirred when it begins to thicken. This process will last about 8 hours and the cake will come out of the mould three or four days afterwards, in a hard lump ready for packing into plantain leaves and gunny bags; square boxes of 18 inches on every side, are the best things for moulding, but at least one of the sides should be moveable, to facilitate the exit of the cake when it hardens. He strongly recommends an active stirring when the paste thickens, as it betters the color of the vegetable wax.

Washing the cakes when they come out of the moulds is very useful for taking away all viscosity—if the cakes are left in the moulds eight or ten days it will be better.

The cost of manufacturing a ton of 2,240 lbs. of vegetable wax, not including the price of 2,240 lbs. of oil is as follows.

20 pounds of crude saltpetre,....	Rs. 1	4
20 pounds of sulphuric acid,....	„ 2	8
Fuel,.....	„ 0	2
Coolies for manufacturing and		
packing, .....	„ 0	1

Total Co.'s Rs... 4 6

Mr. Loarer prefers crude saltpetre to refined nitre, as the former yields by its combination

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with the sulphuric acid, a notable quantity of chlorine, which has a bleaching property on the wax; more, it is cheaper.

### 2ND PROCESS.

For a large manufacture the above process would become tedious because it is difficult to procure pots of 20 gallons, the pots are very often broken, entailing a great loss in raw materials and the pots will hardly stand more than eight or ten operations, being very soon corroded by the bi-sulphate of potash formed during process.

The plan of a plant for manufacturing ten tons at every out-turn would be as follows:

A large vat or tub made to contain two thousand gallons, having at two inches above the bottom a number of holes with leaden pipes for drawing out when required, the contents of the vat.

An iron retort in the form of a gas cylinder with a hole—in the centre of the cover of the hole is a small aperture half an inch in diameter for pouring in the acid—this small hole may be stopped with baked clay or wood.

Leaden pipe connects the still with the bottom of the vat.

Many moulding boxes, with one moveable side and moveable diaphragms; distant one from another 18 inches and dividing the boxes into an exact number of cubic cells 18 inches on each dimension.

This machinery being ready, the vat being full of oil, the retort will receive a load of *seven pounds* of crude nitre for every *thousand pounds* of oil in the vat—the hole must then be well secured and luted and the sulphuric acid is poured upon the nitre, through the small aperture using a funnel with a long neck: the small aperture is luted or stoped, and fire is kindled under the retort (Note.—To every pound of crude nitre allow a pound of commercial sulphuric acid); first a slow fire, then a very brisk one should be applied during two or three hours, the oil in the tub will become gradually heated till it reaches 120 to 130° Faht. when the evolution of gas is no more perceptible in the oil, the stopper should be opened and the fire taken out of the grate.

The whole is allowed to cool during the night, and next morning a light film much like cream on the top of milk, is perceptible on the top of the oil, it is then time for opening the holes: the liquid is let into the moulding boxes, where it must be actively stirred as it thickens, as long as the magma will allow a strong man to stir it. The diaphragms are then inserted into the moulding boxes and the whole is left to itself for five or six days, the boxes may then be opened, the diaphragms removed, the cakes taken out, washed, allowed to dry for one or two days on platforms, and then packed in plantain leaves and gunnies.



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If the moulding boxes are made of partitions exactly of 18 inches cube, each mould will weigh 225 pounds, ten packages to the ton, and very convenient for stowing on board.

### *Cost of ten tons by 2nd Process.*

155 pounds of crude nitre,.....Co.'s Rs.	6	0
155 pounds of commercial sulphuric acid,.....	10	0
Firewood, .....	0	8
Coolies, working and packing,....	1	10

Cost of manufacturing 224,000 pounds  
Total...18 2

or per ton... 1 13

### 3RD PROCESS.

A large vat, square or round, being made of wood or sheet iron must be supplied with a fan horizontal or vertical, the bottom of the vat must be calculated so as to leave no corner unstirred by the motion of the fan, the bottom of the vat must be well coated with a mixture of vegetable wax and rosin to preserve it from corrosion by acids, this being done, the vat is filled with oil and three quarters of a pound of nitric acid is put into the vat for every hundred pounds of oil contained in it, the mixture must be then well stirred by the fan, ten minutes for every two hours, until the oil becomes thick, viz., after three or four days, the composition should then be decanted into the moulding boxes and there stirred very actively (as in 2nd process.)

Note.—This process is very expensive compared to the first and second process, and should never be resorted to. The product from this process is improved by the addition on the second day, of one ounce of sulphuric acid for every pound of nitric acid, poured into the vat the first day, this betters the color of the wax and accelerates the result of the operation, but after all, this third process should not be resorted to, as long as it is possible to work the 1st and 2nd process.

### *Candle making.*

Candle moulds being prepared in the usual way with wicks and laid into the casting table, the oil prepared by one of the above processes, should be cast into the moulds, at the precise moment when the composition has reached the consistency of thick congee water.

The candles must then be left to themselves in the moulds, for five or six days, when they will come out with a fine gloss and a light saffron colour.

NOTE.—A very great improvement is obtained in the quality of the candles, by passing a current of chlorine gas through the oil during the process of solidification, when that is made with proper care, a threefold object is obtained :—

1st. Specific gravity increased and melting point raised.

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• 2nd. Colour much improved.

3rd. The melted stuff never runs when the candle is lighted.

These candles are self snuffing, a very important item. It is as yet necessary to learn the composition of a good sort of wicks, before bringing these candles to perfection as an article for the million. There is at Calcutta a manufacturer of wicks on the French principle, and they sell wicks readily to every one who wants them.

Cost of 2,240 pounds of candles of vegetable wax :—

Four and half candies of oil @ 45 Rs.	
per candy, ... ..	202 8
Working of the oil into vegetable wax, (2nd process),... ..	1 12
Additional cost for chlorine, ... ..	1 0
13,440 wicks at 100 per Anna & cooly.	9 0
Other expenses, ... ..	0 8

Total..... 214 12

Cost to the manufacturer of one pound of candle 1 Anna and 7 Pies, or at the utmost 2 Annas per pound of candle.

Having described the manufacture of vegetable wax the following observations may be made on its mercantile value and its applications in the arts and industry.

Vegetable wax is an excellent lubricator, it has been extensively used on the Madras Railway. Mr. Fletcher the Traffic Manager wrote that he found Loarer's grease capital and they were then using nothing else.

It is in any ones power to make it of different degrees of consistency without lessening its high resistance to heat, it will answer when softer for any description of machinery, and will take with a notable economy the place of tallow so expensive for steam Engines.

Vegetable wax can be bleached perfectly white, and there was sent to the Exhibition of Madras in April 1857 a box containing some 30 pounds of vegetable wax bleached at Vellore, simply by exposure to the sun and dew, and, by keeping it continually sprinkled with water, three days of that treatment being sufficient for bleaching vegetable wax perfectly white.

Very good and cheap candles are made, immediately from the raw material, and without any chemical preparation whatever.

Vegetable wax can be converted into soap, and some tolerable samples of soft and hard soaps, have been made.

About a hundred pounds of vegetable wax was treated at Calcutta by a manufacturer of stearine candles, and it has been as easily converted into stearic acid as is the tallow by the

same process. The produce of tallow compared to vegetable wax was :

Tallow produce, Stearine 55, Oleine 43, loss 2.  
Vegetable wax „ 48, Oleine 48, loss 4.

The manufacturer of Calcutta said that with care and a more complete acquaintance with vegetable wax he would succeed in bettering the difference of produce between the two facts ; the price of tallow at Calcutta, varies from 12½ to 14 Rupees per Indian maund.

Vegetable wax is a very good substance for the preparation and keeping of all sort of leathers and hides, such as accoutrements for the army, harness, boots, ropes made of raw hides, &c., this substance never hardens, and never changes by exposure to the air, into a sort of varnish, rendering the leather hard and prone to cut, as is the case when tallow is mixed with oil. At home the tanner will find that stuff to answer as a succedaneum for more expensive oils, such as whale oil now in use. During the last three years Mr. Loarer used nothing else for the harnesses of his horses and it answered very well.

Vegetable wax is the cheapest material to be used for the preservation of all articles of iron of comparatively small value, such as bar iron, steel, Engineers and Artillery tools and spare pieces, the inside of guns, grape shot, &c., and in one word all articles of iron kept in store rooms and godowns, where they go to decay in so short a time—vegetable wax would equally do for round and hollow shot, but for the tremendous heat attracted by the black piles of shot in the Arsenals, in these tropical climates. It would prove superior to any coating now in use for shot, if the piles were only protected from the heat by the commonest sort of covering ; for ships of war where shot go so rapidly to decay the composition is capital. From vegetable wax never drying, it will never interfere with the progress of loading a gun, nay it would on the contrary facilitate its entrance into a foul gun.

Before affirming that this composition is good for the preservation of *small arms* and *polished steel*, it will be necessary to make long and accurate experiments, but it is recommended that the vegetable wax be melted into boiling water, so as to expel all excess of oxygen from the compound, and then it may be fit for use.

Vegetable wax being easily made of various consistency with a nearly fixed melting point, varying from 140 to 155° Fahr. it is the best thing for greasing the axles of gun carriages and waggons of the Artillery, Engineers and land transport corps.

The same substance may with great advantage and economy, be substituted in the studio of the statuary and the workshop of the moulder and casters in bronze or brass, to the bees wax which

is now very extensively used and costs about eight times more—a mixture of 8 parts of vegetable wax and two parts of bees wax is I think superior even to pure bees wax for ductility and evenness of grain.

Colonel Pears had no doubt that the vegetable wax would answer for the atmospheric Railways, he said that the only cause preventing the extension of the system, was the impossibility of finding a lubricating body, resisting a great heat and cheap enough for large workings.

Vegetable wax is a specific against white ants.

*Vegetable wax in a commercial point of view.*

Vegetable wax is manufactured from the coarsest sort of lamp oil, (Castor oil the produce of *Ricinus communis* v. *Cyclopædia of India*.) Castor oil seeds are planted in July in the Districts of North and South Arcot, Salem and Coimbatore, the crop is gathered in February—the seeds are sown only on the poorest description of dry land, whose assessment is from 1½ to 3 Rupees per cawny.

Many varieties of *Ricinus* grow wild in Bengal, upper India, Malabar, Canara and Guzerat (*vide Cyclopædia of India, para. 2,457—5,740—7,165 and particularly page 1607 and following*) all these plants produce seeds containing an oil appropriate for the manufacture of vegetable wax.

The land for castor oil seeds receives five ploughings, deep furrows are then traced on the field with a plough, and a man deposits one or two seeds every three and sometimes every two feet, into the furrows and covers the seed with earth by a slight motion of his foot, the furrows are about three feet apart, sometimes more—when the castor oil seeds are planted in that way, the whole field is sown broad cast with one of the three following seeds—1st Thowaray (*Cajanus indicus*) 2nd Ooloondoo (*phaseolus mungo*) 3rd Caramany a plant of the leguminosæ family (see *Cyclopædia of India, para. 2,508*) the average produce of one cawny of that description of land, planted in oil seeds and small grains is 1,000 lbs. of oil seeds and an equal quantity of the small grain—the castor oil seeds and small grain generally fetch the same price in the market of Vellore, viz., 14 to 16 seers per Rupee, when the soil is richer, the produce is sometimes as much as 2,500 and 3,000 pounds of *Ricinus* seeds per cawny—to show to what use may be brought the large tracts of waste land found in the Carnatic, only the poorest description of land, will be considered. Herewith is given an accurate statement of the expense of cultivation and produce of dry land assessed near Vellore at 2 Rupees per cawny : and having had during two years, large plantations in that district, Mr. Loarer vouched for the accuracy of his statements.

Cost of cultivation of one cawny of dry land



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planted in castor oil seeds and Thowaray—with the price for reducing the crop into oil.

Paid to Collector for Government revenue .. .. .	2	8	
Ploughing 5 times, 1 Rupee each turn. .... .	5	0	That is the price at Vellore paid to ryots but when working one for another they do it for nearly half the price.
Children for bushes, weeds, and stones .. .. .	1	0	
Sowing 1 cawny and covering	0	4	
Nine seers of castor oil seeds...	0	9	
Nine seers of Thowaray....	0	9	
Harvesting and packing....	2	8	Same observations as above.
Manufacture of the seeds into oil.. .... .	5	0	
Carriage to Madras ....	2	0	
Total cost Rupees....	19	6	

Produce and sale of the above, a measure weighing about 4 pounds.

250 measures of oil seeds at 1 Anna each .. .. .	15	10
250 do of Thowaray 1 Anna each... .. .	15	10
Stalks and straw.. .. .	2	0
Total produce Rupees...	33	4

There is brought to account all the expenses for ploughing, sowing, harvesting, manufacturing and packing the crop, at a very remunerative price for the ryot (for such were the prices paid when employing villagers at Lattery near Vellore) the net profit of the ryot will be 14 Rupees per cawny, after having been paid for all his works. *Note.—When oil seeds sell for one Anna a measure it is a very remunerative price, oil then sells at 40 Rupees per candy:*

In obtaining castor oil good sound seeds yield from 43 to 45 per cent of dark lamp oil, by the boiling and roasting process; oil prepared by that process is very thick, black and viscid, and is preferred for the manufacture of vegetable wax as the albumen in the seeds has been destroyed by the roasting process. Oil of a better colour and more fluid is prepared by boiling the seeds, then peeling them and afterwards passing the almond to the mill but the yield is only from 36 to 40 per cent.

Lastly a limpid and perfectly fluid oil known as *cold drawn castor oil* is obtained for medicinal purposes and sold by Apothecaries, the produce of a hundred pounds of seeds in *cold drawn castor oil*, is very seldom above thirty-three pounds per cent.

(For very complete details of the history, natural and commercial, of the oil seeds in general and castor oil seeds in particular and on the manufacture and prices of that oil—See Cyclopædia of India, page 311 and seq. page 1326 & seq.)

The chances of a tolerable crop in barren land such as is assessed at  $2\frac{1}{2}$  Rupees per cawny is two good years and a bad one—great rains are most dangerous to the plant as soon as it begins

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to flower—the plant flowers during the end of September and all October, these two months are very critical for the prospect of the crop. The castor oil plant withstood very well the terrible droughts of 1854 and 1855, the crops of these two years were average ones—the great rains of September and October 1857 destroyed the whole plantations of that year, and the price of lamp oil rose from 40 Rupees in October 1857, to 55 Rupees as it stands now.

With oil selling steadily at 45 Rupees per candy, the culture of the castor oil plant is very remunerative, and if a Ryot be sure of always selling his oil seeds at one Anna per seer he would till thousands of cawnies now left barren. If further the Ryot had certain means of disposing of that part of his crop without passing through the claws of half a dozen Vaniahs, he would very soon better his condition and in the meantime contribute an unexpected source of revenue to the State, for it is necessary to understand, that not one inch of the land now under cultivation for cereals, should be given to the cultivation of oil seeds, the Ryot would resort for this supplement to his income, to tracks of land never cultivated before, and Government knows there is no lack of waste lands—One of the best means for enhancing the abundant production of castor oil seeds would be the establishment of central work shops where the seeds could be converted into oil and vegetable wax for the Ryot himself, on payment of a small per centage.

In the manufacture of the vegetable wax the manufacturer, as will now be shown can very well afford to pay 45 Rupees per candy of oil, and it is also cheaper to convert oil into vegetable wax for shipment, than to send to Europe the oil in casks.

Cost of ten tons of vegetable wax at the Custom House, Madras:—

25,000 lbs of coarse lamp oil at 45 Rupees per candy...	2,250	0
Cost of reducing the same into vegetable wax... ..	25	0
150 gunny bags and thread for packing .. .. .	30	0
Plantain leaves for the inside of packages .. ..	1	0
6 Coolies for packing.. ..	1	0
Carriage from Vellore to Custom House Madras @ 2 Rupees per candy—not per Railway but by bullock carts—Railway being cheaper but not so careful as bandy med....	100	0
Commission to a Shipping Agent $\frac{1}{2}$ per cent....	12	0
	2,419	0

Cost of same quantity of oil bought at Vellore and sent to Madras for shipment.

25,000 lbs of coarse lamp oil at 45 Rupees per candy .. .. .	2,250	0
25 carts carrying eight dubbers, 6 Rupees per candy..	150	0
Each empty dubber weighs 26 pounds.		

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Hire of 200 dubbers @ 2	
As. per 15 days. ... ..	50 0
Leakage 5 per cent (minimum) ... ..	112 8
Commission for receiving, measuring, storing, and emptying, 2½ per cent ...	56 4
Return of dubbers to Vellore, 4 Rs. per 50 dubbers.	16 0
	<hr/> 2,634 12

Difference in favor of vegetable wax, only for the very short Journey from Vellore to Madras, Rupees 215-12; we will continue the voyage down to England, and at every step we shall see the difference of cost widening.

It is merely on account of its low price that coarse castor oil is not exported to Europe. The price of it does not admit of the heavy expences of casks, leakage and shipment. I will give herewith the continuation of the voyage of the 25,000 lbs. of oil alluded to above.

We have at Madras on one side, 25,000 lbs. of vegetable wax packed ready for shipment and deposited at the Custom House, a mere shipping Agent passes the goods by the Custom House and all is over.

25,000 lbs. of vegetable wax arrived at the Madras Custom House,...	2,419 0
5 boats for shipping, 2 tons per boat for 3 Rupees, .....	15 0
Coolies for shipping, 10 at 2 Annas,	1 4
Export duties, 3 per cent on 2,500,	75 0
Freight for 10½ tons HEAVY @ 2 £ per ton, .....	210 0
Insurance, dock charges, commission, &c.....	X 0
	<hr/>
Total cost in London... X +	2,720 4

### Lamp oil.

25,000 lbs. of lamp oil in the godown of the Agent at Madras,...	2,634 12
Charges from godowns to Custom House, .....	20 0
40 casks @ 12 Rupees 8 Annas each, .....	500 0
Export duties 3 per cent on 3,300,	99 0
Freight of 50 casks of oil @ 12s. 6d. per cask, .....	350 0
10 boats, each taking 4 casks @ 3 Rupees per boat, .....	30 0
Insurance, dock charges, commission, &c.....	X 0
	<hr/>

Total cost in London... X + 3,633 12

'X' will always be heavier than X but we can afford to put them as equal and eliminate them, we will have then the following results.

2,720 for vegetable wax.

3,630 for lamp oil.

But oil is subject to a considerable leakage, and the minimum reckoned upon is 20 per cent ;

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we must then add 20 per cent to the price of lamp oil and we will have then

Price of 25,000 lbs. of vegetable wax in London, .....	Rs. 2,720
Price of 25,000 lbs. of lamp oil in London, .....	4,356

Difference for vegetable wax... 1,636

The means is known for re-converting vegetable wax into lamp oil by a very simple and economical process.

The price of coarse castor oil in London varies from 4½ to 6 pence per pound according to demand—vide *London Public Ledger*, the most complete commercial advertiser.

The price of vegetable wax, though completely new in the market, has never been under £38 per ton; it sold at Havre on the 25th of June 1858 at 51 and 52 Francs per 50 kilogrammes.

The duty on that produce is fixed in France at 50 centimes (5 pence) per hundred pounds; in England it enters duty free; vide *London Public Ledger* of the 25th January 1858, art. wax, public sales. 516 Baskets Madras vegetable wax, were bought in at 40 Shillings.

Same journal 2nd page, 1351 baskets of Madras vegetable wax per "*Triumph*" to be sold on Friday 29th January 1858 at the Baltic sale rooms.

The cheapness of the vegetable wax may be illustrated by mentioning that the horse grease a horrid compound, the product of ebullition of the unhappy omnibus and hackhorses of London and Paris, a black, soft, fetid grease, never sells in London or Paris under £32 per ton, should vegetable wax never reach a high level in the markets of England and France, it would yet afford a very ample remuneration to the manufacturer, and it must be borne in mind that it is altogether a new produce, a new culture, and that the revenue, the ryot, the carrier, the Custom House, the boatman, the sailor, have already had an ample share in the benefits offered by this new branch of commerce.

### Process for re-converting vegetable wax into oil.

The vegetable wax should be melted with water at a gentle heat, (not to make it boil); when the wax is melted it must be drawn from above the water by a syphon or a cock and put into a large vat, at the bottom of which there is a layer of bisulphate of potash swimming in a sufficient quantity of sulphuric acid, so as to prevent the oil coming in contact with the bisulphate of potash.

The room where the vat is, must be kept for 24 hours at a heat of 140° by means of a stove, the heat should be then gradually decreased to 120° and 100° and in four days the oil will be perfectly liquid and will congeal no more.

In Extract from the Minutes of Consultation, in the Public Department, dated 13th October 1858, No. 1271. The Right Hono-



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able the Governor of Madras in Council remarked that the report submitted by the Committee is very favorable to Mr. Loarer's proposition, and furnishes a comparative calculation of the cost of manufacturing the Vegetable Wax, from which it appears that Mr. Loarer's process is of a far more economical nature than that described in Chemical Books. By the experiments by Mr. Norton, the cost for one ton is Rupees 112-1-6; while by Mr. Loarer's process No. 1, it is Rupees 4-4, and by process No. 2, only Rupees 1-11-3 per ton. The Government observed that the value of the discovery depends on its really proving the means of increasing the export of one of the commonest articles of indigenous produce which at present does not find its way into foreign markets on account of the form in which it is prepared, not enabling it to bear the cost of transport. The demand for Wax and Stearine in Europe is so large and so permanent, that the Governor in Council has no doubt this Vegetable Wax will command an extensive sale.

The Governor in Council authorised the sum of five thousand Rupees for Mr. Loarer, and guarantee a further payment of five thousand Rs. to Mr. Loarer on the export of 500 tons of the Vegetable Wax.—*Madras Committee's Report on Mr. Loarer's Vegetable Wax.*

More recently, Mr. Loarer experimented on samples of the following oils, viz.;

a. Illipoo.	f. Cotton seed.	k. Croton tiglium.
b. Margosa.	g. Mustard.	l. Ground nut.
c. Piney cotay.	h. Rape.	m. Cold drawn castor.
d. Cottomanaka.	i. Ramtil.	n. Coconut.
e. Wood.	j. Soapnut.	o. Gingely.

All the samples apparently were genuine, unadulterated and of good quality. He subjected each oil to the usual Chemical treatment for the manufacture of Vegetable Wax and the following were the results.

(2997) *Illipoo Oil*, produces with great facility a perfectly white substance of the consistency of good tallow, Illipoo oil is with great advantage mixed with Castor oil for the manufacture of Vegetable Wax, and as Illipoo oil has always fetched a very low price in the Madras Presidency, the discovery of this property renders it very valuable and will enhance its price for the future.

(2998) *b. Margosa Oil*, produces a vegetable wax as hard as any made from the best lamp oil and of a light saffron color. Margosa oil has always been sold in the Madras Presidency at a very low price but its supply has never reached what it could attain should this oil become saleable. Margosa as well as Illipoo oil mixed with an equal quantity of cold drawn Castor oil produces a hard vegetable wax of an agreeable roseate color.

(2999) *c. Pinnacotay*, produces a thick jelly of a dark olive color and by the addition of a small quantity of sulphuric acid the jelly as-

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sumes a dirty orange color and swells into a soft, elastic substance of the appearance of sponge cake.

(3000) *d. Cottamanaka Oil*, is changed by Mr. Loarer's process into a thick jelly of a rich saffron color, but never hardens. A small quantity of Sulphuric acid causes the above jelly to swell to nearly double its original volume, but the *Magma* never thickens.

(3001) *e. Wood Oil*, is decomposed by Nitric acid into a black spongy substance, hard and brittle, heavier than the liquid part of the oil into which it sinks: the liquid part assumes a color nearly like that of Port Wine and is about as fluid as water, much more liquid than the natural Wood oil. A thin coating of that liquid part applied to a board of deal wood formed in twenty four hours a transparent varnish perfectly even and bright, the spongy matter above alluded to seems to possess the same properties as a mixture of rosin and Anotto. He obtained two identical substances by dissolving with Nitric acid, the common asphalte used for pavements. A small quantity of Sulphuric acid poured uncautiously on the second day into the Wood oil which had been in contact with Nitric acid caused it to rush out of the glass with a violent effervescence and disengagement of smoke aromatic fumes and a heat of about 200° Fah. the aromatic smell was very sweet and much like Benjamin. He thinks the Wood oil worthy of great attention on account of the varnishes it can supply.

(3002) *f. Cotton Seed Oil*, was insensible to the treatment by nitric acid and after 48 hours remained as clear as when poured out of the bottle a few drops of the sulphuric acid mixed to the oil after the 48 hours of contact with nitric acid caused a violent eruption and all the phenomena recorded for Wood oil the only difference being for Cotton oil the absence of the aromatic fumes.

(3003) *g. Mustard Oil*, remained unchanged under action of nitric acid alone. A few drops of sulphuric acid caused the oil to assume a reddish muddy color and on the fifth day decomposed into a light spongy matter having a viscid appearance floating upon a red limpid oil.

(3004) *h. Rape Oil*, has undergone identical changes to what is recorded of Mustard oil.

(3005) *i. Ramtil Oil*, same effects and results as per Mustard and Rape oil.

(3006) *j. Soapnut Oil*, same effects as above.

(3007) *k. Croton tiglium*, unchanged by Nitric acid: the addition of a small quantity of sulphuric acid caused, in 48 hours, a decomposition of the oil, the sides of the glass became coated with a soft elastic crust of a pale dirty yellow color and very similar in its velvet like appearance to lees of freshly made wines or of the fungus on vinegar.

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(3008) *l. Ground nut Oil*, unchanged by Nitric acid and the addition of sulphuric acid causes the oil to assume a dirty and muddy red color, but the limpidity is not changed.

(3009) *m. Cold drawn Castor Oil*, becomes red and soon solidifies into a dirty pale yellow mass.

(3010) *n. Coconut Oil*, unchanged by three days of contact with Nitric acid, on the fourth day added a proportional quantity of sulphuric acid and noticed no change on the fifth and sixth days, the change if any being an additional fluidity of the oil but from a dirty white the oil has become pale red.

(3011) *o. Gingely Oil*, conducts itself with the two acids exactly like Coconut oil.

Mr. Loarer thinks that the Mustard, Rape, Ramtil, and Soapnut oils would become eminently siccative after undergoing a careful treatment of Nitric and Sulphuric acids and could be used for paints in supercession of Linseed and other similar oils.—*Mr. Loarer's M.S. Report to Madras Committee reporting on the Resources of India.*

## (3012) WEIGHTS AND MEASURES OF INDIA AND SOUTHERN ASIA.

*General remarks.* With the exception of the weight of the Rupee, (180 grains), there exists no defined standard of Weight or Measure in India. There are certain traditional standards, but these differ all over the country, and in practice are not adhered to, nor is there any Law on the subject, by which the gross irregularities that prevail can be checked.

The unit of *Linear* measure in India, is generally the distance from the elbow to the tip of the middle finger of a tall man. This length is known as the *hat*, Hind., or *moolum*, Tam, *mora*, Tel., and averages  $19\frac{1}{2}$  inches. It is always translated *cubit*, though invariably exceeding the English cubit of 18 inches, by  $1\frac{1}{2}$  or 2 inches. In the Southern Carnatic, the *adee*, or length of a tall man's foot, is in use, and averages  $10\frac{1}{4}$  inches. The *Guz* of India, (translated *yard*), is partially in use all over India, but varies in different localities from 26 to 36 inches. In Bombay it is 27 inches, and in the North-West Provinces of India it has been defined by Government, for the purpose of Survey, at 33 inches.

Although the above are the *Indian* linear measures, the English yard and foot are very extensively adopted by Native artizans; and in all the Public Works of India, which give employment to thousands of Natives, the English linear measure is invariably employed. Considering therefore that this Measure is already so familiar to the people, and that their own is so undefined, and fluctuating in practice, there can be little doubt but that the English Yard and Foot should be determined on as the new Metrical system.

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*Superficial* measure need only be noticed in connection with *Land measure*. According to the ancient Indian practice an area of land is often named after the quantity of seed required to sow it, or the quantity it will produce, and of course the actual area differs according to the opinion of the person who makes the estimate. Where linear definition is given, mention is made of Rods or Ropes, of so many cubits, but the cubit is undefined, and areas of the same denomination, are derived from different multiples of the Rod or Rope. Of the more definite terms the *Bheega* prevails in Bengal and the North-West Provinces. In Bengal it is 1,600 square yards, and in the North-West Provinces it is 3,025 square yards. In the Bombay Presidency it is not authoritatively defined, but averages about  $\frac{2}{3}$  of an acre. The term is quite unknown in the Madras Presidency, where the authorised measure is the *Cawnie* of 57,600 square feet, or 1.3223 acre; there are also other local land measures defined, but presenting great differences one from the other; as the *chain* of 3.64 acres, the *seed-cottah* of 1.62 acres, the *vaylie* of 6.6 acres, and the *bullah* of 3.82 acres.

The greater portion of the North-West Provinces of India has been surveyed by Government Officers. The area of each village (or rather parish, to use an English term) is given in Imperial acres, but the areas of the *fields* appertaining to each village, are given in local *bheegas*. The introduction of the acre therefore was only partial. In the Surveys lately made in the Bombay Presidency, the area of each field is recorded in acres, not only in the English, but in the vernacular accounts, and the term is well known and understood among the people. In the Madras Presidency, the districts of Bellary and Cuddapah were measured field by field (as far as the land was cultivable) in acres, in 1803, and Kurnool in the same way in 1842. In Salem, the records of field measurements made about 1800, are entered both in the Native terms and their equivalents in acres, and the acre is by far the best known.

Under the above circumstances, the introduction of the Imperial acre seems not only most desirable, but quite feasible. Where lands have already been *accurately* measured, and contents recorded in Native terms, those terms might be converted into acres; and in the progress of the Surveys now going on, all measurements might be at once in acres. This plan has already been successfully adopted in the present re-survey of the Southern districts of Madras, and the acre is superseding the *cawnie*. In the new survey now in progress in the Madras Presidency, acres and hundredths of acres are employed.

With regard to the *subdivisions* of the acre they have hitherto in the Madras Presidency been in 40ths (or Goontas), and 16ths of 40ths; or else in 16ths (annas) and 4ths of 16ths.



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Where the natural fractions of halves and quarters, are not employed, a decimal subdivision is most desirable; not only is the computation far easier to the surveyors, but records in decimals, are far more intelligible than in Roods and Perches, and money values in relation to areas more easily calculated. The areas recorded in the Ordnance Survey of Great Britain, in which Survey every field is measured, are now in acres, and *decimals* to the third place. There cannot be a better authority for a decimal subdivision, and it offers no difficulty to the Natives, as regards *land* measurement. It is hardly necessary to argue why a decimal subdivision of *Land* measure, should be easier of introduction than a decimal arrangement of Weights and Measures in general. It is, in practice, a mere division of account. In England not one person in a thousand is the least put out by the substitution of Decimals for Roods and Perches: whereas, not one in a thousand but would be inconvenienced (for a time) by the substitution of 10ths of Gallons for Pints, or by Ounces of ten to the Pound. The *cawnie*, itself, is in several districts in the Madras Presidency, subdivided into 100ths, and in the present re-survey of the Southern Districts of Madras, the decimal subdivision of the acre has been authorised, as stated above.

The larger Weights throughout India are utterly devoid (in practice) of rule or uniformity, being generally misshapen lumps of metal, or stones, and varying in value as well as denomination in every district almost. The traditional and acknowledged unit of Weight is generally the RUPEE; thus the "Seer" is said to be so many Rupees weight; but it is very seldom possible to say what was the weight of the Rupee forming the original unit. The Rupees of the different Native Governments varied considerably, and even under the British rule the Sicca Rupee of Bengal was 192 grains, when the Arcot Rupee of Madras was  $176\frac{1}{2}$ . These differences in the small unit would effect the larger ones considerably, and aggravate the uncertainty as to what was their original and real value. Besides this, terms of the same denomination do not by any means denote the same value. A Candy, (Khundee) for instance, in one place differs very much from the Candy of another place. Again, a Candy, for instance, of Metal, is not the same as a Candy of Tobacco; and there is a different Candy for Cotton and Sugar. The Candy used in buying, is not always the same in the same place, as the Candy used in selling. There has however, from time immemorial been a small weight called a *tola*, in use by Goldsmiths and Jewellers, which has maintained a ponderary value of about 182 or 184 grains. The Furruckabad rupee used in the N. W. Provinces, had hitherto been 180.234 grains. The Rupee of Madras and Bombay had been for some years

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180 grains. The "Sicca" Rupee of Bengal still remained at 192 grains, but this coinage was discontinued in consequence of Act XVII. of 1835, and since that date the Company's Rupee of 180 grains has been the only Rupee coined at any of the Government Mints. When the Government of India, by Act VII. of 1833, (the main purport of which was to fix the weight of the Furruckabad rupee at 180 grains) decided on 180 grains as the *tola*, they in the same Act declared that this *tola* should be "the unit of a general system of *Weights* in all Government transactions."

The "Table" of Weights adopted by the Government of India for the use of their own offices, is in accordance with Native usage in Bengal, and was approved of by the Chambers of Commerce in Calcutta and Bombay. It is as follows:

1 Tola	=	180 Grains.	
5 Tolas	=	1 Chittak.	
16 Chittaks	=	1 Seer = 80 Tolas	= 2.057143 lbs. avoird.
40 Seers	=	1 Mun = (or maund) =	82½ lbs. exactly.

If any system of Weights be selected from those now current in any part of India, the above seems to be the best, not only because it is founded on a defined standard, originating in the weight of the coin of the realm, but because it includes the "Seer" of 80 tolas, which is a weight known and acknowledged in *some* degree all over India. It is in short a Ponderary system which as far as *facility of introduction* is concerned, has a preference over any other.

In the 140,000 square miles comprised in the Madras Presidency, not a single bazar-man has altered his Weights one grain, or his Measures one fraction of a cubic inch in consequence of the Calcutta notification. Neither was the Act intended to go farther than legalise the *tola* as a unit. The "Table of Weights" has never been adopted in the Madras Presidency, even in *Government transactions*. In the Fort St. George Gazette of the 20th October, 1846, the following Table of Weights was published as that which was to be used in that Presidency:

180 Grains	=	1 Tola	
3 Tolas	=	1 Pollum.	
40 Pollums	=	1 Viss = 120 Tolas	= 3.0857 lbs avoird.
3 Viss	=	1 Maund = 960 Tolas	= 24.6857 lbs avoird.

This "Table" was sanctioned for Madras by the Government of India, and is, as will be seen on comparison, entirely different, with the exception of the *tola* unit, from the Weights adopted for Calcutta.

It will be observed that the Madras Government Table does not acknowledge the "seer" weight at all; but still a seer weight of 80 tolas, known as the "pucka" seer is met with all over India. This quantity is not much in use in Southern India, where the "seer" of 24 tolas, called the "cutcha" seer, is more common. The original unit of WEIGHT in Southern India, seems to have been the gold coin called by the English,

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a "pagoda." It is now uncurrent, but was about 52½ grains weight. 80 pagodas weight is, according to the Native Tables, a "seer" (cutcha) of 24 RUPEES weight. This corresponded with the average weight of the old Native rupees of 175 grains; but since the introduction of the "Company's rupee" of 180 grains, the "pagoda weight" is 54 grains generally. The same confusion formerly existed in Bengal, between a Sicca WEIGHT of 179½ grains, and a Sicca RUPEE of 192 grains. There are also "seers," both in Madras and Bombay, of 84 Rupees weight. Still, a seer of 80 tolas could no doubt be more easily introduced throughout India than any other weight.

The Calcutta official "man" or maund, is 82½ lbs, avoirdupois, and is not known in any part of the Madras Presidency, except at the Government Salt Depôts, and in the Coast trade of grain to the port of Madras. The Madras maund is 25 lbs; the Bombay maund is 28 lbs.; and the Surat maund in use on the Western Coast is 31½ lbs.

The chief objection to the Ponderary system enunciated by the Government of India, is that it cannot be made to accommodate itself to the Imperial Weights of Great Britain, and this, considering the importance of the trade between the two Countries, and the fact that one is a Dependency on the other, is a serious drawback.

The following Table shows the nearest proportions that can be obtained, for converting the above system of Weights, to those of Great Britain (avoirdupois).

38,889 Tolas	= 1 lb.
350 Tolas	= 9 lbs, <i>exactly</i> .
1 Seer	= 2.057143 lbs
35 Seers	= 72 lbs. <i>exactly</i>
1 Mun	= 82½ lbs. <i>exactly</i> : or (82 2857143.)
7 Muns	= 576 lbs. <i>exactly</i>
49 Muns	= 36 cwt. (of 112 lbs.) <i>exactly</i> .
27,216 Muns	= 1 ton (of 2240 lbs)
490 Muns	= 18 tons <i>exactly</i>
300 Muns	= 11 tons (strictly 11.0204)

It will be seen that under such a system, there will always be difficulty and confusion in adjusting the weights of articles of commerce to the English Table, and as the connection between the two countries increases, and the European element becomes more marked, the inconvenience will be more practically felt.

Mr. Prinsep, in his "Useful Tables" gives a list of some 300 Rupees of Native Mints, mostly of dates prior to any regular coinage of the Indian Government. They average about 175 grains; and had the Government adopted 175 grains instead of 180 for the rupee, a "Seer" of 80 rupees would have been exactly 2 lbs. avoirdupois; and a "Mun" of 40 seers, exactly 80 lbs. avoirdupois, and 25 Muns exactly 2,000 lbs., or the proposed new Ton for Great Britain. The rupee of 180 grains is now so well established in all the Presidencies, and there is such an enormous silver circulation in India, that it seems impracticable to reduce the Rupee to 175 grains; and if the same content of pure silver were re-

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tained, (which would be necessary for the credit of the State) the "touch" would be raised from ½ or .91666, to .942, which may be deemed too high for durability. The touch of silver in France (where, as in India, it is the legal standard of value) is .900. In England it is .925.

Mr. Bayley proposes a "seer" of 77½ tolas, instead of 80. As far as the facility for testing doubtful weights by the coin of the country, this would answer as well as 80 tolas, for a quarter rupee is just as much a coin of defined weight (45 grains,) as a whole rupee, and where one can be obtained, the other can.

This "seer" would differ 2½ tolas weight from the one adopted for Government transactions in Calcutta, but practically the "seer" Weights in India, even though professing to be 80 tolas weight, are seldom so much. The seer is generally said to be so many rupees weight, and as the rupees of former days, on which these seers were founded, averaged about 175 grains, the original weight would be more nearly obtained by a "seer" of 77½ tolas. Besides, as has already been stated the 80 tola "seer" is not universal the "seer" weight varying in different localities, and to substitute a 77½ tola weight in these localities, would not be more of an innovation, than substituting a "seer" of eighty tolas.

The "seer" of 77½ tolas would be only 5 grains short of a double pound, or two pounds avoirdupois; that is, it would be 13995 grains, instead of 14000; which would only make a difference of 1.42 lbs in a proposed new Ton of 2000 lbs, a difference within the limits of error in weighing. It would be advisable perhaps, to define the "seer" legally, as equivalent to two avoirdupois pounds; and it might at the same time be declared that a seer of 77½ tolas weight would not be condemned as short.

It will be observed from what has been stated above, that the Government of India has neither in Act VII. of 1833, nor in the "Table" set forth by them, made any allusion to Measures of Capacity, although it is a matter of more importance than the Weights, seeing that by far the greater portion of the domestic transactions in India are in grain. The Calcutta Chamber of Commerce, when on the 19th of May, 1836, they resolved to adopt the Weights of the Government, urged the introduction of the Imperial gallon for Liquids, and proposed that new Measures of capacity for grain, should be regulated by the Weights, but they did not show how this was to be done; nor does it seem at all necessary to make a distinction between "Dry" and "Liquid" Measures. The Government declined to act on the recommendation of the Chamber, and whatever might have been contemplated by Act VII. of 1833, nothing has ever been announced by way of defining the capacities of the Grain Measures in Bengal. The only Measures made up (at the Mint) by authority of the Go-



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verment, are the Imperial gallon and its sub-multiples, for use in the Medical and Victualling departments; and it seems that the Court of Directors in their Despatch of 17th July, 1833, expected the "general adoption in India" of the Imperial Measures. The *Madras* Government however in their Notification referred to above, promulgated a Table of Measures to be used in Government transactions, as follows:

1 Olluck =  $12\frac{1}{2}$  cubic inches.  
8 Ollucks = 1 Measure (Puddee) = 100 cubic inches.  
8 Measures = 1 Marcal = 800 cubic inches.

And this arrangement was sanctioned by the Supreme Government for the Madras Presidency. Though 10 years have elapsed, these Measures have not been adopted by the people; and even in the Town of Madras, the Government have authorised the stamping with the Government Seal, the "customary" Measure or "Puddee" of  $104\frac{1}{4}$  cubic inches, which has been the *real* standard since 1802.

In Bombay, the Government have attempted to introduce a "Seer-measure" of the capacity of 57 cubic inches, but this being so much smaller than the usual "Seer-measure" of that Presidency, the scheme has not met with success.

Mr. James Prinsep's observation that "India does not, properly speaking, possess Dry or Liquid Measures, and that where these are employed, they depend upon, and in fact represent, the "seer" or "maund" weight," is true of India generally, but in the neighbourhood of Madras and in some of the Southern Districts, the ordinary grain Measure is a "puddee," which does not represent any weight; and the "puddee" varies greatly in different localities.

The most common grain Measure, and one which is to some extent known in almost every part of India, is the "seer-measure;" this is always understood to be a Measure which *when heaped* will contain a "seer" weight of rice, or in some places instead of rice, a mixture of the 9 most common grains, known as the *nou-danium* measurement. The 9 grains used in the Madras Presidency, are Rice, Chenna, Cooltee, Pes-soloo, Minamaloo, Dholl, Anamaloo, Gingely oil-seed, and Wheat. As only *heaped* measure is recognised by Native usage, it is evident that there is no rule as to the *cubic content* of the Measures used; for vessels of very different cubic content may contain the same when heaped, in consequence of having different diameters. It is on this account that the values given to Indian Measures, in such Tables as those of Major Jervis, or Dr. Kelly (in his *Cambist*) being founded on the gauged cubic contents, do not represent the true quantities.

In 1852, the Madras Board of Revenue instituted a special enquiry into the Grain Measures of each district. They were found to be of all shapes and materials. Some were in the form

## WEIGHTS AND MEASURES.

of hour glasses; some were joints of bamboo, and some earthenware pots; but as a general rule, it was found that they were in most districts intended when *heaped*, to contain a seer weight, or a definite number of seers, either of rice, or of mixed grain, but usually rice; and the "seer" weight was generally that of 80 tolas. Measures in every district were gauged with Water, Rice, and Cooltee or Horse gram, and it was found that (taking 100 cubic inches of water to weigh 140 tolas, which at a temperature of  $81^{\circ}$  is true to  $\frac{1}{2}$  a grain) Rice on an average, weighed 113 tolas to the 100 cubic inches. In the Northern Districts, it averaged 111 tolas; in the Town of Madras 114 and in the other Districts 112 and 113. The rice used was what is called in Madras, "Putcharisee, TAM.," Kucha Chawul, HIND., or RAW RICE, to distinguish it from "Poolungul, TAM.," Oobala Chawul, HIND., or that which is scalded before husking. Old rice would weigh something lighter. From experiments made by Mr. Bayley a few years ago, he found 100 cubic inches, of the 9 mixed grains, to weigh 115 tolas. From the Reports of Mr. Shaw, of Ahmedabad, in the Bombay Presidency, in 1849, it appears he found that a Measure holding  $137\frac{1}{4}$  tolas of water, held when struck  $114\frac{1}{4}$  tolas of mixed grain, which gives  $116\frac{1}{2}$  to 100 cubic inches; and Mr. Reeves, of Poona, found that a vessel containing 80 tolas weight of water, would hold  $66\frac{3}{4}$  tolas of mixed grain, which also gives  $116\frac{1}{2}$  tolas to 100 cubic inches. Cooltee, or Horse gram, was found by the Madras experiments to average 116 tolas to 100 cubic inches, but it varied from 113 to 118. From the same experiments, the weights of the *heaps* (of rice) on various diameters were determined, as shown in the margin; but it is probable that the dealers in the bazaar, would not heap quite so liberally. The accuracy is of course not so great but that the diameter may be considered either the inner or outer.

The best "Seer-measures" are about  $3\frac{1}{2}$  to  $3\frac{3}{4}$  inches in diameter, and 6 inches deep, but they are never true cylinders. Their cubic contents are from 66 to  $66\frac{1}{2}$  cubic inches, holding from 74 to 75 tolas of rice when *struck*, and 80 when heaped. It so happens that a vessel of  $66\frac{1}{10}$  cubic inches capacity will contain at a temperature of  $84^{\circ}$  (a good day temperature for India,) 16650 grains, or *exactly*  $92\frac{1}{2}$  tolas weight of water. This would hold on an average when *struck*,  $74\frac{1}{4}$  tolas weight of rice; and with a diameter

Diameter Inches.	Tolas wt. of Rice in Heap.
2	2
$2\frac{1}{4}$	$2\frac{1}{4}$
$2\frac{1}{2}$	3
$2\frac{3}{4}$	$3\frac{1}{2}$
3	4
$3\frac{1}{4}$	$4\frac{1}{4}$
$3\frac{1}{2}$	5
$3\frac{3}{4}$	6
4	7
$4\frac{1}{4}$	9
$4\frac{1}{2}$	11
$4\frac{3}{4}$	13
5	15
$5\frac{1}{4}$	18
$5\frac{1}{2}$	21
$5\frac{3}{4}$	24
6	27
$6\frac{1}{4}$	30
$6\frac{1}{2}$	34
$6\frac{3}{4}$	38
7	41
$7\frac{1}{4}$	45
$7\frac{1}{2}$	49
$7\frac{3}{4}$	53
8	58
$8\frac{1}{4}$	63
$8\frac{1}{2}$	68
$8\frac{3}{4}$	74
9	80
$9\frac{1}{4}$	92
10	104

74 tolas weight of rice; and with a diameter

## WEIGHTS AND MEASURES.

of 3.7 inches, 80 tolas if *heaped*. Thus if a "seer" of 80 tolas be adopted, such a Measure would be exactly what is understood by the Natives of the country to be a "Seer-measure."

The sub-multiples of the "Seer-measure" are generally (not always) used for *Liquid* measures in India. The only liquids sold by measure, are Ghee, (clarified butter,) Oil, and Milk. No defined measure is used for Arrack and Toddy (intoxicating liquors), and Spirits in Madras are sold by the "dram" of 5.775 cubic inches, or  $\frac{1}{160}$ th of the old Wine gallon.

Instead of making 40 "seer-measures" = 1 "Mun-measure," which might cause a confusion in the terms of Weight and Measure, (and the term Mun or Maund is not in use as a grain measure in Southern India,) it would be better to give some name to a quantity represented by 100 Seers. This might be called a "Saotee," from *sao*, a hundred. The "Table" adverted to above would be as follows :

DRY AND LIQUID MEASURES.							
Seers.	Cubic inches.	Tolas of Water.	Tolas of Rice when struck.	Tolas of Rice in heap.	Total weight	Diameter inches	Depth inches
I.	61.1	92 $\frac{1}{2}$	74 $\frac{1}{2}$	51 $\frac{1}{2}$	80	3.7	6.2
II.	123.2	185	149	11	160	4.5	7.7
III.	198.3	277 $\frac{1}{2}$	223 $\frac{1}{2}$	16 $\frac{1}{2}$	240	5.3	9.0
IV.	264.4	370	298	22	320	5.7	10.3
V.	330.5	462 $\frac{1}{2}$	372 $\frac{1}{2}$	27 $\frac{1}{2}$	400	6.2	10.9
VIII.	528.8	740	596	44	640	7.3	12.8
X.	661.0	925	746	55	800	7.7	13.0
LIQUID MEASURE.							
$\frac{1}{2}$	33.0	46 $\frac{1}{4}$				3.0	4.7
$\frac{1}{4}$	16.5	23 $\frac{1}{8}$				2.5	3.4
$\frac{1}{8}$	8.25	11 $\frac{1}{16}$				2.0	2.6

Mr. Bayley proposes as a Measure of *Capacity*, a vessel to be called a "Seer," but exactly equivalent to an Imperial Quart. The present "seer-measure" averages a capacity of 66 $\frac{1}{2}$  cubic inches: the Quart is 69.3185. The present "seer-measure" contains when *struck*, about 74 tolas of rice, or 76 of mixed grain, and about 80 tolas of either when *heaped*: the Quart would contain 78 tolas of Rice, or 80 of mixed grain when *struck*, and (with a diameter of 4 inches,) about 86 tolas when *heaped*; but *heaped* measure should not be recognised by Government. He thinks that as there exists an English Measure which corresponds (taking *struck* content) so closely to the Native "seer" of 80 tolas, or to the "seer" of 77 $\frac{1}{2}$  tolas which he has proposed, that it should be adopted, which ever of the two "seers" of *weight* the Government may select. It is also to be added, that the Quart will contain an even number of tolas (rupees) weight in water; namely, 17450 grains,

## WEIGHTS AND MEASURES.

or 97 tolas *exactly*, at a temperature of 84° Fahrenheit. This may be calculated from the former Table.

The "Seer-measure" then, would be defined as a vessel containing 97 tolas of water at a temperature of 84°, and its bulk 69.3185 cubic inches. A reference to the water being *distilled*, or the height of the Barometer, will not be necessary in practice. The Barometer in the Tropics fluctuates very slightly, and a fall of 1 inch, due to an elevation of about 940 feet, would only make a difference of .615 grain, to be deducted from the normal 97 tolas assigned to the Quart-seer.

It would not be necessary, if the Government recognized *struck* measure only, to define the diameters (or even the shapes) of the vessels of capacity, for all that is required is that they shall contain a certain number of tolas weight of water. Still for uniformity's sake, and the more easy discovery of fraud, the vessels should be cylindrical, and it would be desirable that the models, as well as all vessels made up at the Government Stores, should have a diameter proportionate in some simple ratio, to the depth. The diameter the same as the depth would be the best, but those who are accustomed to measuring grain and salt, assert that this would be too broad to be convenient, and a diameter one half the depth too narrow. A good proportion is that of 3 to 4, and the contents of a cylinder being given, it is easy to compute the requisite diameter and depth

Let  $s$  = cubic contents given.

$d$  = diameter to be found.

$h$  = depth to be found.

3:4 = diameter to depth.

$$\text{Then [I] } d = 3 \sqrt[3]{\frac{s}{.7854 \times \frac{4}{3}}} = 3 \sqrt[3]{\frac{s}{1.0472}}$$

$$\text{And [II] } h = \frac{s}{d^2 \times .7854}$$

From these Formulæ, we obtain the following Table for both *Dry* and *Liquid* Measure.

Quarts.	Tolas water at 84°	Cubic inches.	Diameter in inches.	Depth in inches.	Tolas Rice. 113 tolas to 100 cub. in.
I.	97	69.3185	4.04	5.39	78.3
II.	194	138.6370	5.10	6.80	156.6
III.	291	207.9555	5.83	7.80	234.9
IV.	388	277.2740	6.42	8.57	313.2
V.	485	346.5925	6.92	9.28	391.5
VIII.	776	554.5480	8.09	10.79	626.4
X.	970	693.1850	8.71	11.62	783.0
$\frac{1}{2}$	48 $\frac{1}{2}$	34.66	3.18	4.25	39.2
$\frac{1}{4}$	24 $\frac{1}{4}$	17.33	2.55	3.40	19.6
$\frac{1}{8}$	12 $\frac{1}{8}$	8.66	2.00	2.68	9.8



## WEIGHTS AND MEASURES.

If a "Seer" Weight of  $77\frac{3}{4}$  Tolas = 21lbs Avoirdupois, were adopted, the "Seer-measure" if the vessel be struck, would correspond sufficiently; for the weight of rice varies from 112 to 114 tolas to 100 cubic inches; and if the 9 grain standard be taken, the above "Seer-measure" will contain just 80 tolas (at 116 tolas to 100 cubic inches) and be when *struck*, the exact equivalent of what is now the average "Seer-measure" when *heaped*. This of course will render its introduction much easier than any other struck Measure that can be adopted.

Even in the Madras Presidency, where the "Seer-measure" is not recognised in the Government Notification, such a Measure averaging 80 tolas weight of Rice when *heaped*, is in use in many of the Districts, and the Sepoys of the Native army always buy by the Seer, generally considering it to be  $\frac{2}{3}$  of the Madras "Customary" Measure of  $104\frac{1}{4}$  cubic inches, which would give  $69\frac{1}{2}$  cubic inches, or an Imperial Quart. On the 17th July, 1855, the Madras Government, in consequence of some dispute on the subject, decided that the Sepoys' "Seer-measure" should be  $5\frac{1}{2}$  of the "Ollucks" named in their proclamation of 1836, or  $68\frac{3}{4}$  cubic inches. This closely corresponds with the Quart of  $69\frac{1}{2}$  cubic inches, which Mr. Bayley proposes as the standard "Seer-measure."

The only multiple of the "Seer-measure" that seems necessary for accounts, is one of 100 Seers, which might, as proposed above be called a "Saotee." For sub-multiples Mr. Bayley propose *eighths* (at'hees) as more in accordance with Native usage. It is seldom that a less measure appears in commercial accounts than single seers, and therefore there is not so much object in a decimal sub-division.

The objection to the "Seer" proposed by the Bombay Government, which is a vessel holding a Seer of 80 tolas weight of water, or a capacity of 57 cubic inches, is that it is a *misnomer*. If the Native term "Seer" be used at all, it should be the Native idea of a Seer, that is, a vessel containing a seer weight of *grain*. The new Bombay Seer for grain is not what it is supposed to be, and it is no wonder that success has not attended the attempt to introduce what the people consider a deception. A little difference *above* the usual "Seer," would not have been of so much consequence, but this proposed Seer only holds 70 tolas of mixed grain, even when *heaped*. If it were desired to have a Measure analagous to a Seer, to contain a definite number of tolas weight of water, it would have been better to have gauged the Bazaar Seers with water, and have taken the average weight in tolas, about 93, and fixed on that for the standard Seer-measure; The Bombay Government in their Proceedings of the 30th July, 1849, proposed this, but it does not seem to have been acted on but if the "Seer-measure" is *not* to accord at all with the Native

## WEIGHTS AND MEASURES.

Measure, it would be just as easy, and far better on other grounds, to introduce an English Measure of Capacity at once.

The Metrical System which Mr. Bayley would propose for India, as combining more decidedly than any other that he can think of, the three great objects, viz., assimilation to the English system, approximation to the existing Native system, and a means of testing both Weight and Measure of Capacity by the coin of the country, is as follows: I. For *Linear* measure, the English yard and foot, without at present defining the subdivisions. II. For *Land* measure, the Acre, decimally subdivided. III. For *Weight*, the Seer, of 21lbs. avoirdupois corresponding to  $77\frac{3}{4}$  Rupees weight; with a multiple of a "Mun" of 50 seers, (= 100lbs.) and sub-multiples of "Annas" or 16ths of Seers. IV. For Measure of *Capacity*, a "Seer-measure" identical with the English Quart, and defined as containing 97 tolas of water at a temperature of  $84^{\circ}$ , (containing when struck, about a "Seer-weight" of mixed grain) with a multiple of a "Saotee" or 100 seers, and sub-multiples of "at'hees" or eighths.

Mr. Bayley has succeeded in obtaining a decimal subdivision of the Acre in the new Revenue Survey of the Carnatic, and he also had occasion to recommend a decimal notation of the Assay reports of the Madras Mint.

The Natives of India will not of their own accord do what the people of England would not do without a legal enactment, and any Law, must be compulsory. It would have been deemed useless to attempt the introduction of a uniform metrical system by a Proclamation in the Gazette, or by official influence, in England, where all classes of people admitted the inconvenience of so much diversity, and it is not likely that such measures will be successful in India, where the people do *not* admit such inconvenience, and the petty dealers are *directly interested* in a continuance of the present irregularity.

It may be thought that as it is already a penal offence to use false Weights and Measures, the public are sufficiently secured; but there is little use in testing them as long as the Standards are *not defined* by law and the following are a few instances of the inconvenience arising from this laxity.

The first case was one, where the Land Revenue having been fixed originally with reference to the produce and price of grain, complaints were made of its pressure, in consequence of a continued fall (as it was asserted) of price. To ascertain the truth of this, was of much importance, and investigations were made by Government, in the course of which it was discovered that in one District, the official "Price Returns" had been 20 per cent. in error for some years, in consequence of the grain-dealers having altered the capacity of their Measures. In the second case, a merchant at a seaport town sold

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a certain number of "candies" of copper to a captain of a vessel, who found on re-weighment for sale at Madras, that the weight was short. The seller was able to show that he sold by the Candy where he resided, and if the dispute had not been settled by an amicable arrangement, no official authority could have decided the question, inasmuch as the Candy is so many Seers, and the Seer so many Rupees, but *what* Rupee no one can tell: certainly not the present one, which is some grains heavier than the Rupees of the Native mints, current when the Weights were originally established. In the third case, a long correspondence took place in the Military Department, in consequence of a dispute as to whether a regiment of Sepoys had not overdrawn their rations; it being asserted that the Seer-measure of the town where they were quartered, was too large. The Government requested the opinion of the Board of Revenue, but the only answer they could give, was that the Native "Seer" differed in different places, at the option of the bazaar-men, and that as the Government in their Proclamation had made *no mention of a Seer* for use "in Government transactions," there was no official definition of such a Measure. In the fourth case, the Board of Revenue at Madras were informed that Measures of Capacity were in use in the Town, bearing the Government stamp, and yet differing in capacity from the content prescribed by the Proclamation mentioned above. These Measures were examined, and found to be 4 per cent. in error, but the Stamping Department asserted that they were in accordance with an *old Standard* in their Office, and the Government declined even to prohibit their Seal being affixed to Measures openly at variance with their own Proclamation. All these instances occurred within three or four years, and similar cases happen constantly, for want of some positive law on the subject, and the evil cannot be remedied by a mere Proclamation, which is not binding. It is now 10 years since the Madras Proclamation was published, and models distributed over the country with injunctions to the Public Officers to press their adoption; but with very few exceptions, the attempt has failed, and those very exceptions only add to the discordance already prevailing. It is to little purpose for Government to proclaim a Standard, if its use is not enforced, or if it is not to be considered as decisive in case of dispute. It appears obvious, that where such inconvenient discrepancy and uncertainty exist, it is the duty of Government to decide upon some Standard, and having once decided, not to allow the people the option of accepting it or not. It will often happen that when a practice is insisted on by law, and penalties attached to its infraction, no resistance will be made; whereas if the people are aware that there is no law, and no means of enforcement,

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their opposition will be most pertinacious and if they can only hold out long enough it must be effectual.

It may be said that in some of the Bombay provinces a new Standard has been introduced with success without legal compulsion. That a reform in the *Weights*—that is, selecting the best known of those already in use—has been partially carried out by the personal influence of some energetic magistrates, is no doubt the case; but as regards the *Measures* of Capacity, a most important branch of metrology to the people of India, the attempt has only succeeded apparently, in one or two instances; and to show how little is to be expected from the progress of education, and march of intellect, the reform has been found impracticable (there being no *law* to enforce it) in the towns of Bombay and Surat, where it might be supposed that official influence and educational enlightenment would have aided the desired object.

Even in those cases where the shopkeepers are *said* to have adopted the new Weights and Measures, assertions are not sufficient. When the subject was under investigation at Madras, Reports were received from two Districts, most positively asserting that the Government Standards were in use; but on subsequently *sending for* Measures actually used in the bazaars, it was ascertained that the Civil authorities had been misinformed completely and Native subordinates err often from ignorance.

All Government transactions, accounts, tariffs, &c., should be in terms of the new System, and in every purchase made by the Public Departments, their own Standard Weights and Measures should be employed. This would supersede the attempts (always futile) to specify on every occasion, in equivalent terms of the authorized standard, the ever varying and uncertain values of the Native Weights and Measures. For general purposes, and as a guide to the Departmental officers, Tables of equalization should be prepared for each District, showing the average results of experiments made to determine the value of the local Weights and Measures. Such Tables though useful, will not of course be conclusive in every case of purchase, inasmuch as Weights and Measures differ in different villages, and the Tables can only give the result of the average of the District. Such Tables have been lately compiled in the Presidency of Madras.

The following memorandum by Mr. Bate, being an Enclosure in a Letter from the Court of Directors of the E. I. Company to the Government of Madras, dated 6th July, 1829, on the occasion of forwarding Standard Weights and Measures in accordance with Act 5, Geo. IV. cap. 74.



# WEIGHTS AND MEASURES.

TABLE I. [Thermometer.] TABLE II. [Barometer.]

Temp. Fahr.	Grains to add or deduct.	Barometer Inches.	Grains to be added or deducted.
55°	+ 25.30	.01	.0246
56	+ 22.46	.02	.0492
57	+ 19.36	.03	.0738
58	+ 16.00	.04	.0984
59	+ 12.38	.05	.1230
60	+ 8.56	.06	.1476
61	+ 4.38	.07	.1722
62	— 0.00	.08	.1968
63	— 4.62	.09	.2214
64	— 9.49	.1	.2460
65	— 14.60	.2	.4920
66	— 19.94	.3	.7380
67	— 25.52	.4	.9840
68	— 31.33	.5	1.2300
69	— 37.38		
70	— 43.63		
71	— 50.06		
72	— 56.69		
73	— 63.52		
74	— 70.55		
75	— 77.78		
76	— 85.21		
77	— 92.84		
78	— 100.67		
79	— 108.70		
80	— 116.93		
81	— 125.36		
82	— 133.99		
83	— 142.82		
84	— 151.85		
85	— 161.08		
86	— 170.51		
87	— 180.14		
88	— 189.97		
89	— 200.00		
90	— 210.23		
91	— 220.66		

At a temperature of 75° Fahr. a Gallon of distilled water weighs 77.78 grains less than 70,000 grains.  
Or 70,000 grains = 69922.22 grains.

Ex. Suppose the Barometer at 29.54 inches. (below 30°)

$$.5 = 1.2300$$

$$.04 = .0984$$

1.3284 grains to be deducted from the Gallon of 70,000 grains.

If the Barometer is above 30 inches, the grains are to be added.

# WEIGHTS AND MEASURES.

The following Abstract adapted to lbs. avoirdupois and to Tola (or Rupee) weights, has been prepared from the above.

Temp.	Grains of water in 100 cubic in.	Diff. in grains.	Avoir. lbs.	Tolas.
80°	25203.6		3.6005	140.020
81°	25200.6	3.0	3.6001	140.003
82°	25197.5	3.1	3.5996	139.986
83°	25194.3	3.2	3.5992	139.968
84°	25191.0	3.3	3.5988	139.950
85°	25187.7	3.3	3.5983	139.932
86°	24184.3	3.4	3.5978	139.913
87°	25180.8	3.5	3.5973	139.894
88°	25177.3	3.5	3.5968	139.874
89°	25173.7	3.6	3.5963	139.854
90°	25170.0	3.7	3.5957	139.834
91°	25166.2	3.8	3.5951	139.812
100°	25129.0		3.5899	139.600

—Mr. W. H. Bayley in No. 4 New Series of Madras Journal of Science for July to September 1857.

Mr. Prinsep remarks that the system of weight established in India by Regulation VII of 1833, was founded on the same unit as the rupee of the equalized monetary system of British India. This unit of the British Indian Ponderary system is called the tola, which weighs 180 grains English troy weight, and from it, upwards, are derived the heavy weights viz:—Chattack, Ser, and Man or Maund; and its subdivisions, the smaller or Jeweller's weights called Mashas, Ratis, and Dhans.

The following scheme comprehends both of these in one series.

Man.	Panseri.	Ser.	Chhatak.	Tola.	Masha.	Rati.	Dhan.
1	8	40	640	3,200	38,400	3,07,200	12,28,800
	1	5	80	400	4,800	38,400	1,53,600
		1	16	80	960	7,680	30,720
			1	5	60	480	1,920
				1	12	96	384
					1	8	32
						1	4

(3013) The "Man" or Maund of 3,200 tolas, is that established by Regulation VII of 1833, and differs from the many weights of the same name throughout the country.

(3014) Panseri from پانچ five and پسر ser, as its name denotes, is a five ser weight.

## WEIGHTS AND MEASURES.

(3015) Ser سیر A Ser, is the commonest weight in use in the retail business of the bazars of India, and as it varies in quantity with the article sold, it has to be described as the Ser of so many tolas. The standard or Bazar Ser of Bengal, being always 80 tolas. The Ser of salt is 82 tolas.

(3016) Chhatak from چھ Six and ٹیکا marks, is the lowest denomination of the gross weights and is commonly divided into halves and quarters (called in Bengali kachha), thus marking the line between the two series, which are otherwise connected by the relation of the ser &c. to the tola.

(3017) Tola تولا The tola is chiefly used in the weighing of the precious metals and coins.

(3018) Mashas ماشه Ratis رتی and Dhans دھان are used chiefly by native goldsmiths and jewellers. They are also employed in the native valuation by assay of the precious metals.

The following table will show how far the Indian system of weights corresponds with the Troy weights of England and with the "Système métrique of France." The coincidence of the former is perfect: and in the latter, the masha nearly accords with the gramme and the ser with the kilogramme.

British Indian Weights.	English Troy Weights.				French Weights.
	lbs.	oz.	dwt.	grs.	grammes.
One Man. ... ..	100	0	0	0	37320.182
One Ser ... ..	2	6	0	0	933.005
One Chhatak ... ..	0	1	17	12	58.310
One Tola ... ..	0	0	7	12	11.662
One Masha... ..	0	0	0	15	0.972
One Rati... ..	0	0	0	1.875	0.122

The following scale will suffice for the conversion of English Troy weights into those of India.

lb. Troy.	Oz.	Dwt.	Grains.	Tolas and Decimals.
1	12	240	5760	32.000
"	1	20	480	2.6666 etc.
"	"	1	24	0.1333 etc.
"	"	"	1	0.0055 etc.

The following are a few of the valuations for the principal weights of Europe, etc. extracted

## WEIGHTS AND MEASURES.

from Kelly's Cambist, p. 222, the weights in Troy grains have been converted into tolas by dividing them by 180.

Place and Denomination.		Weight of a single lb. mark &c. in tolas.	Number equal to 1 man or 100 lbs troy.
Aleppo,	Metical.....	0.405	7890.410
Basra,	Miscal.....	0.450	8000.000
Cairo,	Rottolo.....	36.965	86.564
Calicut,	Miscal.....	0.383	8347.826
China,	Tael.....	3.221	993.446
Constantinople,	Chequee.....	27.538	116.199
Damascus,	Ounce.....	2.600	1252.173
Denmark,	Mark.....	20.183	158.546
England,	Pound.....	32.000	100.000
France,	Kilogramme.....	85.745	37.320
Germany,	Cologne Mark....	20.044	159.645
Holland,	Mark.....	21.100	151.658
Italy,	Florence and Leg-horn Libra.....	21.111	109.923
Mocha,	Vakia.....	2.655	1205.020
Pegu,	Tical.....	1.138	2427.307
Persia,	Dirham.....	0.839	3812.297
Portugal,	Mark.....	19.675	162.642
Prussia,	Mark.....	20.050	159.600
Rome,	Libbra.....	29.077	110.049
Russia,	Pound.....	35.102	91.161
Spain,	Mark.....	19.725	162.230
Venice,	Mark.....	20.452	156.457
Vienna,	Mark.....	24.072	132.933

At Madras the 'man' is assumed as equal to 25 lbs. avoirdupois: and at Bombay the more convenient equivalent of 28 lbs. or one quarter cwt. has been adopted for the standard man.

The ser at Madras contains 8 palams, of 10 pagodas each, so that like the ser of Bengal it has the subdivision into 80 parts. In the Malabar system also used at Madras, 2½ palams (1 fanam) make a ser, and the tola occupies the place of the man; it is equal to 23.192 lbs.

The ser at Bombay is divided into 30 pa'is or 72 tanks or 72 grains troy each.

(3019) Tank, as now existing in Bombay is 72 grains. In Dharwar it is 50 grains and in Ahmednuggur it is 268 grains.

Man. The man system follows the common scale; viz:

16 Chhataks = 1 ser.

40 sers = 1 man.

20 mans = 1

khandi or mani.

Panseri. The use of a five ser weight also universally prevails under the name of Panseri, dhari or visa. The dhari from its name however, seems to be properly a measure, and accordingly, while in Malwa it is equal to 5 sers, in other places it is found of 4, 4½, 5½, 10, 11, and 12 sers.

(3020) The terms adhola or adheli half; pao or powah, quarter; adhpao half quarter, explain themselves.



## WEIGHTS AND MEASURES.

### (3021) *Dry and Liquid Measures.*

India does not, properly speaking, possess dry or liquid measures. Where these are employed, they depend upon, and in fact represent the ser or man weight and the value of a vessel of capacity rests solely on the weight contained in it. The mode in which this is effected for the dry measures of the south and west of India is by taking an equal mixture of the principal grains, and forming a vessel to hold a given weight thereof so as to obtain an average measure: sometimes salt is included amongst the ingredients. Trichinopoly is the only place where grain is said never to be sold by weight. The markal (properly Marakkal, from the Tamil) and para are the commonest measures: the latter is known throughout India. In Calcutta it is called ferra and is used in measuring lime etc: which is still recorded however in mans weight. In its weights, Southern India retained, from the ancient Metrology of the Hindus, most of the names and terms properly hindu, پالا pala, تولا tula: visa; بھارا bhara; khari; (? khandi), baha. Throughout the Moghul empire on the contrary, the ser and man were predominant. The word 'man' of Arabic or Hebrew origin, is used throughout Persia and northern India, but it represents very different values in different places. Thus the man of Tabriz is only  $6\frac{1}{2}$  lbs. avoirdupois, while that of Palloda in Ahmednuggur, is  $163\frac{1}{4}$  lbs. The Man of India varies principally as follows:

Man of Bengal, containing 40 sers, and averaging 80 lbs. avoirdupois.

Man of Central India (Malwa Ajmere, &c.)	20 sers & ...	40 ...
„ „ Gujarat & Bombay	40 ... & =	28 ...
„ „ Southern India	... ..	25 ...

There are however, many other varieties of mans, from fifteen to 64 seers in weight, which it is unnecessary to particularize.

By the British enactment of the 1st January 1826, one imperial measure was established as a substitute for the variable wine, oil and corn gallons of England, with their multiples and divisions. This imperial gallon was made to contain 10lbs. avoirdupois weight of distilled water, weighed in air at the temperature of 62° Fahr. the barometer standing at 30 inches. It has a capacity therefore of 277.274 cubic inches, and the following are a few useful derivatives from this unit.

## WEIGHTS AND MEASURES.

Indian Weights.					
	48.611 tolas.				
	97.222				
	4.861 ser				
	38.888 „				
	7.777 man.				
	31.111 „				
Avoirdupois Weight.					
1 lb. 4 oz.					
2 lbs. 8 oz.					
10 lbs.					
80 „					
640 „					
2560 „					
Cubic Contents.					
34.659 c. i.					
69.318 „					
277.274 „					
1.284 c. f.					
10,269 „					
41,075 „					
Imperial dry and liquid measures.					
1 pint...	...	...	...	...	...
2 „ = 1 quart	...	...	...	...	...
8 „ = 1 gallon	...	...	...	...	...
64 „ = 8 „ = 1 bushel	...	...	...	...	...
512 „ = 256 „ = 64 „ = 8 „ = 1 quarter.	...	...	...	...	...
2048 „ = 1024 „ = 256 „ = 32 „ = 1 Chaldron.	...	...	...	...	...

The gallon nearly corresponds with the Panseri or dhari of the Indian. Corn measures while the bushel bears the same proximity to the man weight.

The following is the scale of measures in use at Madras.

		Cub. In.	
1 Olluk	=	11.719	
8 Olluks	=	1 Padi	= 93.752
8 Padis	=	1 Markal.	= 0.750 = 27lbs. 2oz.
5 Markals	=	1 Parra	= 3.750 2dr. water.
400 Paras	=	1 Garce	= 300,000

(3022) *Garce*, TEL. Garissa a Madras measure of 400 paras.

(3023) *Olluk*, HIND. ولی a Madras measure of 11.719 cubic inches.

(3024) *Padi*, TAM. a Madras measure of 8 Olluks.

(3025) *Marakal*, TAM., a Madras measure of 8 Padis.

## WEIGHTS AND MEASURES.

(3026) *Paṭra*, TEL., a Madras measure of 5 Markals.

(3027) *Ceylon*. The dry measure of Ceylon, is thus given in the Oriental Metrology.

		gallons.	inch.
4	Cutchundoos = 1 Ser	= 0.24	= 4.35 dram. + 4.35.
4.8	Sers = 1 Coornuly	= 1.15	
2.6	Goornis = 1 Markal	= 2.88	
2	Markals = 1 Parra	= 5.76	= cube of 11.56 ins.
8	Parra = 1 Amonam	= 46.08	= 5½ bushels.
8½	Amonams = 1 Last	= 432	= 6½ quarters.

(3028) Linear Measures.

(3029) *Biswa* from بیس HIND., Twenty, is the twentieth part of a Beegha, and besides being a measure of land, is also used to signify the extent of proprietary right in an estate. Each estate or village is considered an integer of the Beegha which is divided into imaginary Biswas and Biswansees, to show the right of any particular party. Thus the holder of 5 Biswas is a holder to the extent of one fourth of the entire village; precisely in the same way as the *As* was used amongst the Romans. Thus, *heres ex summuncia*, heir to one-twenty fourth;—*heres ex dodrante*, heir to three fourths;—*heres ex asse*, sole proprietor. In the same manner, *bes*, *bessis*, was used to express a *biswa* *berar*,—*socius ex besse*, and thus in sound and meaning, for of course there is no real connection, there is a close resemblance between the words. *Bes* when it was thus applied as a Sub-division of the *As*, was the eighth part of a Jugerum or acre; not, as is usually applied, two thirds.

(3030) *Coss* کوس HIND. The itinerary measure of India, of which the precise value has been much disputed, chiefly on account of the difficulties which attend the determination of the exact length of the Gaz or Yard. The Ayeen-i-Akberree lays down distinctly that the Coss consists of 100 cords (tunab), each cord of 50 Gaz; also of 400 poles (ban), each of 12½ Guz: either of which will give to the Coss, the length of 5,000 Gaz. The length of the Coss, as ascertained from the average distances of the old Minars or Coss pillars, is = 2 miles, 4 furlongs, 158 yards. In different parts of India however, these vary.

The *Guzeratee Coss*, is the greatest distance at which the ordinary lowing of a cow can be heard, which is determined to be 50 Jureebis or 15,000 Guz. This Coss resembles the Chinese *lih*, i. e. the distance which can be attained by a man's voice, exerted on a plain surface, and in calm weather. Another in Bengal, is estimated by plucking a green leaf and walking with it till it dries. Another is measured by a hundred steps made by a woman carrying a jar of water on her head and a child in her arms. All these are very indefinite standards. The same may be remarked of the Oriental *meel*, as well as the European mile and league. The two former evidently derive their name from the Roman *Milliare* and the difference of the value proves that the mere name was borrowed without reference to

## WEIGHTS AND MEASURES.

its etymological signification. According to the *Kamoo*s, the oriental Meel is a lax and vague measure, but it has been considered by Dr. Lee to be to the English one, as 139 to 112. The league also, from the German *legen*, to see, and signifying the distance that can be readily seen by the eye on a plain surface, is as indefinite as a Guzeratee Gao, and a Bengal or Dhuppea Coss. Coss, is an Indian word: the equivalent in Persian is Kuroh کروه, the same as the Sanscrit word Krosa, of which four go to the *Yojan*, about the precise value of which different opinions are held, four English miles according to Bopp; 4½, 5 and 9 miles according to Professor Wilson; but according to the distances in Fi Hians route, the *Yojan* in his time, was equal to seven English miles, and this agrees much better with what we find the *Yojan* to be when we resolve it into its component parts.

8 Barley corns = 1 finger

24 = 1 Dund

1000 = 1 Krosa

4 = 1 Yojan

and estimating the fingers breadth at eight barley corns, this makes the *Yojan* equal to six miles, one hundred and six yards, and two feet.

In the Linear Systems of India, the basis of all is the same, the cubit or human forearm: and this unit is found in Oriental countries as well as in the West, divided into two Spans and 24 fingers' breadths. Thus under the Hindu princes, the hath (in Sanscrit hasta) was equal to two *vitesti* or spans and to 24 *angula* (angula). The *angul*, finger, is divided into 8 *jau* (Sanskrit yava) or barleycorns. 4 Hathas or cubits = 1 danda or staff: 2000 dandas make = 1 Krosa or kos, which by this estimation should be 4000 yards English or 2½ miles. The *Lilavati* states that 10 haths make one bans or bamboo and 20 bans in length and breadth = 1 *niranga* of arable land.

Natives of India continue speaking of the *hath* or cubic, alluding to the natural human measure of 18 inches, more or less, and it is practically used in measuring off cloths, ribbons, &c., and in taking the draft of water of a boat. In many places also, in Bengal and in Southern India, the English cubit has been adopted as of the same value as the Native measure.

In Burmah, the people seemingly use a linear measure of this name, consisting of the natural cubit plus a band breadth, which would be about twenty inches.

(3031) *Doncha* دونچا four and a half. A word in use with the surveying Ameens of India, when reducing their linear measurements to Beeghas; the other words used by them in fractional multiplication are,

Deorha	1½	Poncha	5½
Dhuma	2½	Khoncha	6½
Honta	3½	Sutoncha	7½
Dhoncha	4½		



## WEIGHTS AND MEASURES.

The size of the fields rarely require the Ameens to go beyond this.

In Madras, Sir Thomas Munro established a measure (called a ground or mani) of  $60 \times 40$  or 2,400 square feet, of which 24 make a kani = 57,600 square feet, = 6400 square yards, or exactly equal to four Bengal Bighas.

The Madras kani is to the English acre, as 1 to 1.3223, or as 121 to 160 nearly.

In Chingleput, the *adi* or Malabar foot is used, which is 10.46 inches : 24 *adis* = 1 kali, and 100 square kalis = 1 kani or nearly an English acre. The common kali however is 26 *adies* or  $22\frac{1}{2}$  feet which makes the kani = 1 acre,  $28\frac{1}{2}$  *perches*.

(3032) Guz. گز or yard. The *Ilahee* Guz of Akbar is assumed by the British Government of India to have been 33 inches. The value of this measure varies in different parts of India. In some places the English yard of 36 inches is understood and will doubtless soon supersede all other values ; but the term *gaz*, is one of Mahomedan introduction.

The Akbari *gaz* for cloth measure = 46 fingers =  $34\frac{1}{2}$  English inches.

The *Ilahi* *Gaz*. established by Akbar as the sole standard measure of the empire = 40 fingers =  $30\frac{1}{2}$  English Inches.

The Akbari *beegha*, of 3600 square *gaz*, = 2600 square yards = 0.538 or somewhat more than half an acre, on the above estimation.

The *Ilahi* *gaz* of Akbar was intended to supersede the multiplicity of measures in use in the 16th Century ; and in a great degree it still maintains its position in the Upper Provinces of India. In general however, different measures are employed in each trade, and the cloth merchant in particular has a distinct *gaz* of his own.

(3033) *Jureeb*. جريب Persian. A measuring chain or rope. Before Akbar's time it was a rope, but he directed it should be made of bamboo with iron joints, as the rope was subject to the influence of the weather. European surveyors use a chain. A *Jureeb* contains 60 *Guz*, or 20 *Gut*, has, and in the standard measurement of the upper Provinces of India, is equal to 5 chains of 11 yards, each chain being equal to 4 *Gut*, has. A square of one *jureeb* is a *Beegha*. Till the new system of survey was established, it was usual to measure lands paying revenue to Government, with only 13 knots of the *Jureeb*, which was effected by bringing two knots over the shoulder of the measurer to his waist. Rent free land was measured with the entire *Jureeb* of 20 knots. A *Jureeb* in Hebrew and Arabic signified originally only a measure of capacity, equal to 4 *Qufeez*, or 384 *Mud*, (Latin *modius*) and in course of time came to signify the portion of land which required as much to sow it as a *Jureeb* would contain. The *Pat*, *ha* and *Nalee* of Garhwal and Kumaon have a

## WHALES.

similar origin.—*Prinsep's Antiquities*, by Thomas, pages 96, 7, 8, 107, 112, 4, 126, 129, 130.

At the cession of the Carnatic besides the Chittoor Pollams in N. Arcot there were the 2 large Zemindaries of Calastry and Cavetnaggur the latter also known as Bom Rauze's country. Throughout the latter country (Bom Rauze's) the foot of the village God of Nanaveram was always taken as the unit of Land Measurement of which

64

= 1 Goontah.

100 Goontah in Poongee.

= 1 Cawnee.

12 or 15 in Nungee.

(3034) WELLS are often sunk in the alluvial soils of India, as foundations for architectural structures.

(3035) WHALES. The following kinds occur at Japan. *Kud suri*, Jap. is caught frequently about Japan, but particularly in the Sea *Khumano*, which washes the Southern Coasts of the great Island Nipon, as also about the islands Tsussima and Goto, and upon the coasts of Omura and Nomo.

*Sebio*, Jap. is the chief, and indeed the largest of the whale kind. It affords most train-oil, and its flesh is very good, and wholesome, so far that fishermen and the common people attribute their good state of health amidst all the injuries of cold and weather, which they are continually exposed to, chiefly to their eating this flesh.

*Awo Sangi*, commonly *Kokadsura*, that is a small whale, is gray or ash colored, smaller than the *Sebio*, from which it also differs something in shape.

*Nagass*, Jap. is commonly 20 to 30 fathoms long, and has this particular, that it can stay under water for two or three hours, during which time it can travel a vast way, whereas other whales must continually come up to the surface of the water for fresh supplies of air.

*Sotookadsura*, Jap. that is, the whale of blind people, so called from the figure of a *Bijwu*, a sort of Lute, which blind people in Japan use to play upon, which is said to be naturally represented on its back. It is not a very large sort, and seldom exceeds ten fathoms in length. It is caught frequently about Japan, but the flesh is reckoned unwholesome food, being as they say too hot, and occasioning coughs, fevers, eruptions on the skin, and sometimes small-pox. It is brought to market with other fish, and sold for the flesh of the *sebio*, but those who know it will never buy it.

*Mako*, Jap. never exceeds three or four fathoms in length. This same name is given to the young ones of the other kinds. This is caught frequently upon the Eastern Coasts of Japan, as also upon the coasts of *Kij nokuni* and Satzuma. Ambergris is found in the intestines of this Whale. The head yields a small quantity of train-oil.

*Iwasikura*, (Japan,) that is Sardin's Eater, has a tail and fins like common fish. They saw this sort when we went up to court between *Oamino*-

## WINES OF PERSIA.

*Al and Simmoseki* and Kæmpfer took it to be that which the Dutch call *Noord Caper*. Of all these several kinds of whales nothing is thrown away as useless, excepting only the large *Shoulder* bone. The skin which is black in most kinds, the flesh which is red and looks like beef, the intestines, which from their remarkable length are called *Feakfirs*, that is, an hundred fathoms long, and all the inward parts are eaten pickled, boiled, roasted, or fried. The fat or blubber is boiled into train-oil, and even the sediments of the second boiling are eaten. The bones, such as are of a cartilaginous substance, are boiled when fresh, and cut, or scraped, cleaned and dried for the use of the kitchen. Several little things are made of the jaw-bones, fins and other bones, which are of a more solid substance, and particularly their fine steel-yards for weighing gold and silver are made of them, and have borrowed their name from thence.—*Kæmpfer's History of Japan*, V. I. p. p. 133, 134.

(3036) WINES OF PERSIA. Persia is supposed to be the native country of the vine; and this opinion seems to receive confirmation from the extraordinary perfection to which its fruit there attains. "Grapes," says Oliver, in his description of the country round Ispahan, "every where abound, and their quality is excellent. None of those which I had tasted at Constantinople, in the islands of the Archipelago, in Crete or Cypress, in Syria, in Province, or in Italy, appeared to me comparable to the *Kismis* grape, of which the berry is white, of an oval shape, and middling size, having a very delicate skin, and no seeds." [*Voyage dans l'Empire Othoman*, Tom. III. p. 108.] At Shiraz, they are described as growing "to a size and fulness hardly to be matched in other climates." [*Travels in Georgia and Persia* by Sir R. Kerr Porter, V. I. p. 706.] "But, according to Mr. Morier, even grapes of Shiraz are surpassed in quality by those of Casvin. That city," he observes, "is environed by vineyards and orchards to a considerable extent, the former of which yield a grape celebrated throughout Persia for the good wine it produces. The vine-dressers water their vines once in the year, which is twenty days after the festival of the Noroz, about the 10th of April; and the vizier mentioned that the soil, which is clayey, is so good, that the moisture it imbibes suffices until the next irrigation." [*Second Journey through Persia*, p. 203.]

The Mahomedan Religion, prohibiting the use of wine to its followers, tends to restrict the manufacture to those places where the Jews, Armenians, or Hindoos, form part of the population. But the Persians have always been less scrupulous observers of this precept of the Koran, than the other Mahomedans; and several of their Kings, unable to resist the temptation, or conceiving themselves above the law, have set an example of drunkenness, which has been very

## WINES OF PERSIA.

generally followed by their subjects. Shah Abbas II., as we learn from Chardin and Tavernier, was much addicted to wine, and made his courtiers share in his cups. His cellars were abundantly stocked with the choicest vintages of Georgia, Karamania, and Shiraz, preserved with great nicety in bottles of Venice crystal; and, every six weeks, he received from the first of these countries a supply of twenty chests, each of them containing ten bottles, and each bottle about three quarts. He had also, at different times, wines sent him from Spain, Germany, and France; but he drank only those of Persia, thinking them preferable to all others. A particular officer was appointed to superintend his wines, and to watch the proceedings of all those who made or sold that commodity; no one being permitted to engage in the trade without an express licence, which was only to be obtained by dint of bribery. [*Voyages en Perse*, Tome III. p. p. 26, 249] At present many Persians indulge secretly in wine, and generally to intemperance; as they can imagine no pleasure in its use, unless it produce the full delirium of intoxication. They flatter themselves, however, that they diminish the sin, by drinking only such as is made by infidels: for "so great is the horror of a Mahomedan vintage," as a late traveller informs us, "that, whenever jars of the wine of Shiraz are discovered, the chief officers of the town are ordered to see them broken to pieces. But all this strictness relates to the Persians alone. [*Travels in Georgia and Persia*, by Sir R. Kerr Porter, V. I. p. 348.] "The Jews and Armenians prepare wine on purpose for the Mahomedans, by adding lime, hemp and other ingredients, to increase its pungency and strength; for the wine that soonest intoxicates is accounted the best, and the brighter and more delicate kinds are held in no estimation among the adherents of Mahomed. [*Voyages de Chardin*, Tom. II. p. 67.] It is chiefly along the line of mountains that stretch from the Persian Gulf to the Caspian Sea, that the best wine districts are situated. Besides the vintages of Shiraz, those of Yezd, Ispahan, &c., are mentioned with commendation by Chardin; and recent travellers add to the list the growths of Teheran, Tabriz, and Casvin. But few of these wines, except the Shiraz, are much known out of the country where they are produced; and even the last mentioned no longer maintains the high celebrity which it formerly enjoyed. Tavernier estimated the quantity annually made at four thousand one hundred and twenty-five tuns, of which a considerable portion was shipped for the East Indies; but both the manufacture and trade in the commodity have declined after the wines of Madeira came into general use in our Asiatic territories.

The principal vineyards in the environs of Shiraz are situated at the north-west of the town, where



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the soil is rocky, and the exposure extremely favourable. The vines are all kept low but occasionally supported by stakes. Among the species cultivated, one of the most esteemed is the *Kismis*; the fruit of which, having an agreeable acidulous taste, is in great request for the table, as well as for the manufacture of wine, and when dried, forms an excellent substitute for currants. Next to it comes the *angoor asji*, a black, or dark purple grape more fleshy than the other, and yielding an excellent red wine, of a deep red colour, and somewhat astringent taste, which Kæmpfer compares to Hermitage: but the quantity made is small. For the more common wines, or those which most frequently come into the market, five different kinds of grapes are used, of which four are white or brown, and the fifth, called *Samarcandi*, from the town of that name, has a black skin with red juice, and furnishes a claret wine. At Ispahan a mucadel grape is grown, which yields a copious supply of must.

When the grapes are gathered, they are brought to the cellar, and introduced into a vat or cistern, formed of masonry, and lined with plaster, about eight feet in length and breadth, and four in depth, where they are trodden; and the juice that flows from them is collected in a trough at the bottom, from which it is immediately removed into large earthen jars, to undergo the requisite fermentation. These jars, which contain from sixty to eighty gallons, and are either varnished in the inside, or rendered impervious by a coating of grease, are carefully covered, and left undisturbed for a couple of days. When the fermentation has fairly commenced, the murk is stirred by one of the workmen with his arms bare; and this operation is repeated for eighteen or twenty successive days. The wine is then strained, through coarse sieves, into clean vessels, which are filled to the brim, and covered with light matting. In these it is allowed to remain for thirty or forty days, and when the secondary fermentation is thought to be completed, it is racked into smaller jars or bottles, in which it can be conveniently transported. That which is destined for exportation is strained a second time. The larger bottles, called *Karabs*, are covered with wicker work, and hold eight or nine gallons,—the smaller, six or seven quarts. They are packed in chests, which generally contain ten small bottlee, or two *Karabas*, and one small bottle between. [Kæmpfers, *Amœnitates Exoticæ*, p. p. 374-8.] The bottles are stopped with cotton, soaked in wax or pitch.

Chardin found the Shiraz wine of excellent quality; and, though inferior in delicacy to the vintage of his own country, and at first somewhat rough to the taste, yet, after drinking it for a few days, he relished it so much, as to give it the preference to all other wines. He admits however, that it does not keep well, being liable to rousiness after

## WITTOBA.

the second year; and that, when drunk freely, it is apt to cause headache. Kæmpfer extols it more highly, placing it, in point of flavour and aroma, on a level with the best growths of Champaign and Burgandy, and contradicting the assertion, that it incommodes the head. [Amœnit Exotic. p. 379.] Since these travellers wrote, and since Hafiz sung the praises of the ruby wine of Shiraz, the declining demand, and the difficulties opposed to the manufacture, have probably tended to impair the quality; for we are told, that, at the present day, "the culture of the vine itself is comparatively neglected at Shiraz; the sorting of the fruit is a delicacy seldom attended to; and the apparatus used in the compression, fermentation, &c. of the juice, is on so confined a scale, that only small quantities of the esteemed flavour are obtained. Indeed, no wine, under one name, possesses such variety of quality; every gradation, from a liquid clear as the most brilliant topaz, to a sour and muddy syrup. When good, the taste should be a little sweet, accompanied with the flavour of dry Madeira, to which, when old, it is not at all inferior [Travels in Georgia and Persia, V. I. p. 707.]

This description of the colour and flavour of the Shiraz wine, however, applies only to the white sort, which, even when of firm and generous quality scarcely deserves to be ranked on a par with the best growth of Madeira, some samples of it betray a slight taste of saffron, which is not unfrequently added by the Armenian manufacturers to their wines, in order to please the eye as well as palate of their customers. The other kind, which is probably the bright-red wine described by Chardin, resembles tent, or the second rate sweet wines of the Cape, and occasionally tastes a little of the pitch used for stopping the bottles in which it is exported. It is not so durable as the white.—*Henderson's History of Ancient and Modern Wines.*

(3037) WITTOBA. Wittoba is a Hindoo idol worshipped at Alundi, but his principal shrine is at Punderpoor, on the Bheema, to the westward of Sholapoor. Wittoba is one of the many subordinate incarnations of Vishnoo. It took place at Punderpoor, a town about eighty miles to the Southeast of Poona. More relates the history of this incarnation. It conveys, unlike most Hindoo legends, a moral lesson.—*Chow Chow*, p. 251.

The three principal gods of the Hindoos, are Vishnoo, Siva, and Bramah, and the three goddesses Doorga, Luckshmi, or Luximee, and Saraswatee Doorga or Durga, is often called Parvati or Parbuttee, or Bowan, Bowanee, or Bhowani. Kali or Kalee, sometimes Devi, and she is spoken of under all these several denominations.

Wittoba is a god of very questionable orthodoxy, but he is very popular among the Mah-rattas, and, therefore, the Brahmins admit him with the best grace they can into their Pantheon. The same is the case with Kundoba, who is yet

more popular among the lower orders of Mah-rattas, and, if possible, less orthodox; they are probably the ancient deities of the Mahratta race, which the Pantheistic spirit of Brahminism has admitted as Hindu divinities.—*Ward's Literature and Mythology of the Hindoos.*

In Isaiah lvii. 6, where the Jews are reproved for their idolatry, stones are mentioned as one of their objects of worship. "Among the smooth stones of the stream is thy portion, *they*, they are thy lot, even to them hast thou poured out a drink offering, thou hast offered a meat-offering. Should I receive comfort in these?"

Veneration for stones may be traced among all nations; the following instance from Scripture reminds one strongly of Hindoo simplicity. "And Jacob rose up early in the morning, and took the stone he had put for his pillow, and set it up for a pillar, and poured oil on the top of it. (Gen. xxviii. 18)—*More's Hindoo Pantheon quoted in Chow-Chow.*

(3038) WOOD. In Bombay in 1848, when the whole of the wood, stored in the great enclosure at Mazagon, occupying the space betwixt the Hope Hall Hotel, the Railway station, the Byculla main road and the shore, was burnt, an attempt was made to convert the vast mass of pure white ashes which remained, into potash. The taste was alkaline, and the conviction was reasonable that wood here, as elsewhere, if completely burnt under exposure to the air would yield potash. It turned out, that in place of this, the whole product of combustion was caustic lime, and this seemed equally to hold good with all trees, whatever their kind. The enquiry was pursued in reference especially to trees burned in the jungle, when the results seemed the same. In reference to many of these last, a curious fact transpired; a tree once set on fire, burned leisurely and quietly almost without flame, not only to the extremities of the branches, but underground to the extreme ramifications of the roots, and this occurred in the case of perfectly sound and healthy trees, full of sap, as well as in the case of those that were dead and dry. The conclusion drawn from these results is, that in these cases nitre, or some other substance tending to promote combustion, must exist in the sap of the tree. Resolved that these results should be removed from the field of conjecture to that of fact, Dr. Giraud commenced a series of experiments, the result of which we hope speedily to see before the world. It seldom happens that the core of trees is exactly in the centre; they seem in Europe, to thicken most rapidly in the direction in which they are most exposed to light and heat. Scotch fir, thus exposed, measure twice as much in this direction as in the opposite. From a very limited number of experiments made on seven-year old saplings here, it appears that, in this time a healthy *Casuarina* will attain an altitude

of 50 feet, and a circumference, a foot above the ground, of 30 inches. At the base, the section has the form of that of a pear cut lengthways, the larger diameter being 10 inches, the shorter 7. Measured across the core, we find the one radius  $9\frac{1}{2}$  inches, the other  $3\frac{1}{2}$ , or nearly double that of the Scottish fir. In another tree of the same age 45 feet in length, two feet in girth, the greater diameter was 8 inches, the lesser 6—the larger radius being 5 inches, the lesser 3. Taking the tree in lengths of ten feet from the root, the seven rings continue to the last, the innermost having extended themselves upwards to the very top as the tree grew. But the eccentricity of the core has now greatly diminished, and the stem becomes nearly round—the predominance of the mass continuing on the same side as at the root. These peculiarities are most conspicuous in the *Casuarina*; but they manifest themselves, more or less in all trees. An Indian Rubber tree planted in 1851, attained a diameter of 7 inches, the core being  $4\frac{1}{2}$  inches from the one side, and  $2\frac{1}{2}$  from the other; the two grew side by side. Very nearly the same law holds good with a Teak and an Acacia. In Europe the thickening is always on the south side of the tree: here, so far as it appears, it is in general mostly due west. In all likelihood the excess of solar heat furnishes the explanation in both cases. North of the Tropics, the sun always shines more or less from the south, and gives out more heat from this than from any other direction. From the Tropics to the Line, the sun is so nearly vertical, that the mass of heat contributed to a tree or any other body perpendicular to the earth, is from east or west. But from dawn till noon the temperature of the sun is comparatively moderate—it is from mid-day till sunset, that the vast mass of heat is thrown off, the rays shooting from the westward. In this direction a tree thickens on the same principle that it expands in Europe to the southward. As these researches are pursued, we trust that they will help to assist us to that marvel of vegetable life—the silicification or petrification of the living trees. We are all familiar with the spongy stony substance called Tabashir, deposited at the joints of the bamboo. The fact is generally known that the Teak tree often becomes in part petrified,—that is the deposition of silica becomes so abundant, as to turn a portion of the trunk into stone, usually resembling the petrified wood of Egypt, Sindh, Goozerat, and Trevicary, &c. In Upper India this is not at all confined to the bamboo or the teak—both remarkable for their siliceous secretions,—forming in the former a beautiful enamel all over the stem, furnishing the sharp points of the leaves, and making the upper surface of the leaves of the latter eminently serviceable as sand-paper. The Ghunbhar wood found in the Nepaul and Chittagong forests contains such quantities of silica that the car-



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penter who contracts to saw it by the foot, makes it a condition in his bargain—that it shall contain no stone. The Ebony and Sissoo, and the Sit-Sal or jungle rose-wood, contain these secretions, though in much smaller quantities. The most mysterious circumstance connected with the specimens from our petrified forests is, that for every atom of carbon or other organic matter that has been removed, an atom of silica has come in its room, the structure remaining so perfect, that under the glass it could not be discovered whether it was a petrified or living specimen we were examining. The experiments of Sir Humphrey Davy shewed that, in Europe, the durability of woods—that is, their capacity of remaining uninjured through long lapses of time,—was proportioned to the weight of charcoal yielded by them, and that there were many woods, heavy of themselves, that left but a small proportional residuum in the retort after destructive distillation. We doubt if anywhere in Europe a piece of timber can be produced known to have existed 800 years; it would be curious to test the fragments of teak which have formed the supports of the ceiling of the caves of Salsette, which must have been in their places for above two thousand years, and are therefore, the oldest pieces of timber known to man.

We fear we may have ventured too far in an attempt to describe an experiment just begun, where the number of facts brought to light is too

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small for generalization; where we confess ourselves to be too slightly acquainted with the subject, to feel certain that we may not have given familiar facts as novelties, or even misemployed a familiar and commonplace nomenclature. Our object has been, to induce others to come forward and assist in promoting an enquiry which approves itself even to the least informed, as in the last degree interesting. It seems to us, little conversant as we profess to be in such things, considering the vast extent, and the extreme fertility of the field, that the aspirants after University honours, could in no way better wipe away the reproach generally attaching to them,—that they could do nothing but learn by rote, imitate or parrot,—than take up for themselves, and carry through unassisted, some branch of enquiry such as that now under consideration, where the facts are within the reach of every one; where sharp and shrewd-witted observation and self-relying originality may easily supply all that is required. They may rely on it, that there are fifty reputations to be made within the island of Bombay by the possession of a little leisure, and a moderate measure of intelligence, observation and reflection.—*The Bombay Standard. November 19, 1858.*

(3039) WUSEEAT NAMEH, Arab. A will.

(3040) WUZZOO AND TYAMMOOM. Arab. Two forms of ablutions prescribed for Mahomedans before engaging in prayer.—*Herk.*

## Y.

(3041) YAK. *Bos grunniens.*

(3042) YAVANA the term by which, in ancient India the Greeks were known.—*Prin. Ind. Ant.*

(3043) YEZDEZIRD, the forty-fifth King in descent of the race of Kaimurs, with whom ended that Persian Monarchy, in the middle of the Christian era, when the Caliph Omar invaded Persia, and in a fierce and well contested battle at the village of Nahavand, about fifty miles from the ancient city of Ecbatana, the fate of the empire was decided, the Persian Army, numbering 15,000 men being defeated with great slaughter. Yezdezird abandoned his kingdom, as lost, and after wandering in disguise for a period of ten years, was treacherously slain in A. D. 651, by a miller to whom his secret had been confided. This event terminated the Sassanian dynasty and the Monarchy founded by Kai Khosroo, the Cyrus the Great of the Greeks.

The era of Yezdezird the 3rd or the Persian Era began on the 16th June A. D. 632. The year consisted of 365 days only, and therefore its commencement, like that of the old Egyptian and Armenian year anticipated the Julian year

by one day in every four years. This difference amounted to nearly 112 days in the year 1075, when it was reformed by Jelal-ood-din, who ordered that in future the Persian year should receive an additional day, whenever it should appear necessary to postpone the commencement of the following year, that it might occur on the day of the sun's passing the same degree of the ecliptic.—*Prinsep's Antiquities by Thomas.*

(3044) YELLANDE, Ziziphus Jujuba? the Malaya name of a tree which the natives use for general purposes. It produces a fruit from which they extract a sweet scented oil, which is used medicinally; and also for the hair of the women on days of ceremony.—*Edye. M. and C.*

(3045) YEMEN. The province of Yemen, which comprises Aden, lies in the southern part of Arabia, and is washed on the west by the Red Sea, and the south by the Indian Ocean. It is of great extent, comprising nearly 70,000 square miles, and consists of two natural divisions, the upper or mountain district, and the lower country called Tehameh. The lower country comprises many desert and sandy tracts.

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still, notwithstanding the scarcity of water, there are several towns and hamlets on and near the sea coast. Along the shore, are numerous small islands, interspersed with coral reefs. Amongst these little islands, is that of Tarsen, celebrated for its grotto of pearls. In this district the Beni-Halal Bedawins are the principal tribe. They are very poor, and live principally by plunder.

Tehameh proper occupies the level country lying between north Yemen and Aden. In the north of Tehameh is Lohaya, an Arab settlement consisting of a few stone houses and a number of mud huts. The harbour is good, and the trade in coffee considerable. The island of Kamran, lying about eighteen miles south of Lohaya, has a better harbour than the latter place, and is much frequented by vessels going from India to Jeddah, as here they can be supplied with wood, water, and provisions. Farther south along the coast is the town of Hodeida, having an excellent port, fortified by a small citadel. The town is under the rule of a dola or pasha, and yields a considerable revenue by the tax imposed on coffee.

But the principal coffee-mart in Arabia is Beit-el-Fakih, situated at a moderate distance from Mokha, and near the mountain regions where the berry grows. The town is of some extent, lying round the citadel, which is built in the centre. Though many of the dwellings were originally constructed of stone, they have become untenable owing to the depredations of a small white ant. Passing along the coast, we meet many cities and villages until we reach the capital of Tehameh. Zebid, so the town is called, lies near one of the most beautiful and well irrigated valleys in the country. Though still possessing many mosques and other public buildings, with a handsome aqueduct, much of its ancient regal splendour has departed. However, Zebid still possesses an academy where the youth of Yemen and Tehameh receive a liberal education, according to modern Arabian ideas, and is besides one of the chief meeting-places where the merchants of Egypt, Arabia, and Persia assemble. Farther south lies the celebrated town of Mokha, four centuries old, and second in importance only to Zebid.

This portion of Yemen that we have described is the least fruitful of the province, but the remainder merits the appellation of "felix" or happy, by which this portion of the great peninsula, was distinguished amongst the ancients. The whole tract is divided into separate portions, by mountains intersecting fertile valleys, and the inhabitants, thus parted, naturally formed themselves into little independent states. Of tracts, thus separated by natural divisions, there are seventy-four, of which we shall only mention a few, Azia celebrated for the bravery of its people, and the valley of Nejran, renowned for the beauty of its site. This fertile region, lying between

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inaccessible mountains, is watered by numerous streams, and is celebrated for the culture of dates and raisins, that obtain a ready sale all through Yemen. The aspect of this region is beautiful, the mountain to the very top being covered with luxuriant vegetation, and the valleys between offering the picture of a continuous garden. The principal town is Hamdan, and is about thirty days Journey from Mekkah. Of these subdivisions of Yemen, that of Sana is the most southerly, stretching even to the Arabian Sea, where it touches Aden.

The tract of country called Belad Aden commences at Bab-el-Mandel, and runs easterly along the coast a distance of 132 miles. This district is for the most part level, and inhabited by native Arab tribes. At about 90 miles from the western extremity, on a rocky promontory, stands the town of Aden. On the same or nearly the same site, there stood in ancient times, a city, well-known to the Greeks as the depot of the trade carried on between India and Egypt. This city was destroyed by the Romans in the first century of the Christian era, a deed of destruction said to have been prompted by the desire of keeping the Indian trade exclusively in Roman hands. As to ruin is easier than to reedify, we hear little of Aden until the eleventh century, when we find it again enjoying all the advantages which its position affords. Its commodious harbours were frequented by ships and the stream of commerce again flowed through the land. During a period of several hundred years, Aden enjoyed the supremacy amongst the ports of the coast, but the discovery of the passage to India, by the Cape of Good Hope, operated so injuriously on the Arabic city, that in a few years all traces of commercial prosperity departed, and the Turks were masters of Aden. Those were the palmy days of Ottoman power, and the military genius of the new conquerors of Aden showed itself in the erection of fortifications which resisted in the time of their strength, the attacks of some of the ablest European forces, and whose ruins long after excited the admiration of travellers. In 1839, Aden became a British possession, and so rapid were the advances in prosperity that the population which in 1839, amounted only to 1,000, had in 1842 risen to nearly twenty thousand.

Aden, is the principal coal station for steamers navigating the Red Sea, and has a good harbour. The little island of Sirah lying on the east side of the town, forms a bay opposite Aden, and from this point, the peninsula extends three miles westward, forming a commodious and safe harbour.

Many persons have found a resemblance between Aden and Gibraltar, a likeness dependent in a great measure on the rocky peninsula, which rising to a height of 1,700 feet, terminates in two points. The similarity is fully established



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in the scarcity of good water that prevails in both places. The great monarch, Soleiman the Magnificent, constructed an aqueduct at Aden, which commenced at a distance of eight miles from the town. The restoration of this aqueduct would, it is thought, supply the want so often felt at Aden. Of the importance of this station, we need not speak, and recent accounts show the imperative necessity of placing the English residents there, out of the power of hostile or mercenary tribes, who, under the influence of malice or avarice may at any time cut off the necessary supplies.

There are two caravan routes leading from Aden into the interior. Each pursues a different course for some distance, but both diverge considerably to arrive at the town of Lahaj, the capital of the Abdale Arabs. It is a dirty town, containing about 5,000 inhabitants, amongst whom are many Jews.

Having given this general description of the province of Yemen in the south of which the state of Aden lies, we shall turn to the southwest, where the straits of Bab-el-Mandel separate Arabia from Africa. These straits, which are between twenty and thirty miles in breadth, are celebrated amongst ancient writers for the dangers encountered by navigators who ventured within these gates of tears.

Perim lies about three miles distant from the Asiatic coast, thus, dividing the waters of the straits into two channels, that on the Asiatic side being narrower but deeper, and also free from the impediments offered by small islands, which are rather numerous on the African side. The entrance of a sea, traversed only by English ships, can be of importance to none but the nation to which these ships belong; any interference with the position we have taken, under such circumstances, must be regarded with a jealous eye.

—*Colburn's United Service Magazine and Naval and Military Journal*, No. CCCLIV. May, 1858.

(3046) YUDHISTHIRA, (kali yuga) its commencement 3101 B. C.

(3047) YOMA. A range of mountains in

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Burmah, supposed to be the Meandrus of Ptolemy.

(3048) YU, *Chinese*. This mineral is supposed by most to be Jade, but Mr. Crawford calls it noble serpentine. It is found near the sources of the Oru, in a long narrow valley, and attracts Chinese traders to Mogoung, who purchase it for exportation to China where it fetches an extravagant price and is manufactured into cups, bracelets, &c. It is found in the form of boulders embedded in a yellow clay. It is of the Yu stone, that the Chinese form their waved emblem of longevity, specimens of which sometimes bring 100 dollars.

James Prinsep, too, considers that this mineral is prase, rather than jade. It is found in the valley of the Ooroo, and tributary of the Ningthe or Kyendwen, some fifty or sixty miles west of Mogoung. The mineral which is dug up by the Shans and Kakhyens, is found in the form of boulders embedded in yellow clay and the larger blocks are transported by means of bamboo frames, borne by four or five men. Both Crawford and Pemberton call this green, translucent and very hard mineral, noble serpentine. It is largely purchased by the Chinese in Burma for exportation to China, where, probably on account of some supposed talismanic or detective virtues, it fetches an extravagant price and is manufactured into cups, bracelets &c. Respectable Chinese at Amarapoora represent this trade as amounting to from six to ten lacs of tikals per annum. This is probably exaggerated; but the mineral is said to sell in China for twice its weight in silver. Dr. Bayfield was informed that the duty on the stone sometimes reached 40,000 Rupees a year. Captain Hannay, however, was told at Magoung that, including this duty, the revenue of the town and neighbouring villages did not exceed 30,000 rupees a year. The persons who come to make the purchases are Chinese Mahomedans.—*Yule's Embassy*, p. 147.

(3049) YURO, in Mindoro, is the heart or pith of the trunk of a palm, known by the name of Cabo negro.

## Z.

(3050) ZAFAR-NAMAH, the Persian name of a work, purporting to contain a conversation between Aristotle and Burzurjmihir.

(3051) ZAYAT, BURMESE. A public shed or portico, for the accommodation of travellers, loungers, and worshippers, found in every Burmese village and attached to many Pagodas. It corresponds to the *Dharm-sala* of northern and the choultry or chuttrum of Southern India. *Yule's Embassy*, p. 23.

(3052) ZEA MAYS. There are six or seven varieties of this. The American variety has been extensively distributed throughout the Himalayan hills and plains of the North West Provinces.—*Jameson's Report*.

(3053) ZEEARUT, ARAB. The visiting of the graves of deceased Mahomedans, on the third day after demise, which is called the "Teeja" meaning third day, when oblations are offered. *Herklots*.

## ZINC.

(3054) ZĒND, a language, in which the Parsee religious books were written by Zoroaster. According to Professor Bopp, the Zend is as old as the Vedas, is in many respects beyond and an improvement on the Sanscrit, and he does not admit it to be a mere dialect of the Zend, though some European authors contend that it is derived from the Sanscrit. The Zend seems to have been spoken in Bactria. Professor Rusk considers that the Zend was the spoken language of Media, and that the Vendidad, one of the books written in this language, was produced before the time of Alexander the Great. That it was the popular language of a great part of Iran. The author Masudi testifies that the books called Asta or Avasta and its commentary the Pazend were in existence in his time. While Rhode has come to the conclusion that the collection styled the Zend Avasta, contains either one or most of the compositions which existed before the destruction of the Persian empire by Alexander. The Zend and Pehlevi are believed by Anquetil du Perron, to have been authentic languages through the medium of which Zertusht on Zoroaster, in the Zendavista, handed down his religious system. Erskine, however, a great scholar, while he believes in the antiquity and authenticity of the Zend, holds that it was never a spoken language, but rather a composite of some peculiar dialect of Sanscrit and spoken Persian, made by the Parsee priests and used for the compilation of the Vendidad, which he believes to have been made about A. D. 229. One or other of these views have been held by Professors Romer; Rusk, Wilson, Bopp, Richardson; Lassen; Vans Kennedy and Sir William Jones who distinctly stated that the Zend had been fabricated by the Parsi priests, from many dialects: that its literature is worthless and that the whole dates no farther back than the Mahomedan conquest of Persia.—*The Parsees*, pages 247 &c.

(3055) ZINC MINES OF JAWAR. Captain J. C. BROOKE, of the *Mewar Bheel Corps*, states that the hilly country of Mēwar has always been known to abound in metalliferous ores, and it is supposed that the produce resulting therefrom was one of the sources of wealth, by which former Rānās of Udyapura, were enabled to contend successfully for so many years against the might and power of the Delhi emperors. The most celebrated of these mines and which were worked to the greatest advantage are undoubtedly those of Jāwar. On one occasion of visiting Jāwar, an old man brought a basket of the ore in its rough state. He described it as being found in veins 3 or 4 inches thick and sometimes in bunches, in quartz rock and mixed with other stone. He broke some pieces with a hammer, showing the good ore and the simple way it was freed from the quartz rock, with which

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then pounded and freed from quartz and placed in crucibles some 8 or 9 inches high and 3 inches diameter; with necks 6 inches long and half an inch in diameter. The mouth being fastened up, the crucibles are inverted and placed in rows on a charcoal furnace when the ore is fused in about 3 or 4 hours. If pieces of the quartz are allowed to remain with the ore, the crucibles of course break. From each crucible the quantity of metal collected does not vary much.—*Beng. As. Soc. Journal*, No. III of 1850, p. 212.

(3056) ZINC, OXIDE OF; Zung-i-Basree. Pers.

(2057) ZONAR, The sacred cord, worn by the Hindoos, called 'zonar,' is regarded by the brahmins as of a highly mysterious and sacred import; and they do not consider an individual as fully member of his class until he have assumed this holy emblem. A brahmin should be invested with it at the age of eight years, by the hands of his father, who, with his tutor, twists that first put on. The zonar must be made by a brahmin: it is composed of three threads, each measuring ninety-six hands; they are twisted together, and folded into three, then twisted again, making it to consist of nine threads; these are again folded into three, without twisting, and each end fastened with a knot. It is put over the left shoulder, next the skin, and hangs down the right thigh as low as the fingers can reach. Of these zonars, a brahmin wears four; the other privileged tribes but three. Some writers call this the brahminical, or priestly, or sacerdotal thread; but not, it would appear, in strict correctness—it not being confined even to the priestly tribe, but worn by three out of the four tribes of Hindoos.—*More's Hindoo Pantheon*, quoted in *Chow-chow*, page 85.

(3058) ZOROASTER, SON OF PUROSHUP;—The lawgiver of the Persians, Zertusht, Zurtoht, Zerdusht or Zeratusht was born in the city of Rai, in Persia, and became known in the reign of king Gushtasp, Darius Hystaspes of the Greeks, the fifth king of the Kaianian dynasty, and who embraced the faith propounded by Zoroaster. Zoroaster is said to have been then of the age of forty, and to have appeared before Gustashp, in the thirtieth year of that monarch's reign, when he produced to the king the sacred books called Avasta, written in the Zend language. The religion commenced in the reign of Gushtasp, or Darius Hystaspes, from which time till the conquest of Persia by Alexander the Great, a period of three hundred years, it was in its most flourishing condition. From that time, the religion of Zoroaster continued to decline, till revived in A. D. 226 by Ardeshir Bakekan, Son of San or Artaxerxes, and the first of the Sassanian kings.

Before the advent of this teacher, the Persians were worshippers of idols, but the religion propounded by him is a theism recognising a Cre-



quetil du Perron, the first duty is to recognise and adore the master of all good, the Principle of all righteousness, Ormuzd, according to the prescribed form of worship, and with purity of thought, word, and action, and generally to honour Ormuzd (the Almighty as he is styled in the Avasta) in all that He has produced. The second point in the theology of the Parsees is to detest Ahriman, the author of all bad, moral and physical, his productions and works. God, according to Parsee theology, is the emblem of glory, refulgence, light, and in this view a Parsee while engaged in prayer stands before a fire or directs his face towards the Sun as the most proper symbol of the Almighty. The Sacred fires of the Parsee fire temples are attended day and night by Andiarvas or Priests and are never permitted to expire. They are preserved in a large chafing dish carefully supplied with fuel, perfumed by a small quantity of Sandal Wood or other aromatics: The illiterate adore this sacred flame, as also the sun, moon and stars, but the educated under the Symbol of fire adore the Almighty or Fountain of light, the author and dispenser of all things, the sun being merely regarded as a creature of the Creator which was to be revered as His best and fairest image, and for the numberless blessings it diffuses on the earth,—while the sacred flame of the fire temples was intended as a perpetual monitor to preserve their purity, of which this element is so expressive a Symbol. In the 16 Schlokes or distiches, which they prepared with a view to explain their religion to the Rana at Damaun, they (1) avowed their worship of a Supreme being (Ormuzd) and the sun and five elements; (2) preserving silence while bathing; praying; making offerings to fire and eating; (3) their use of incense, perfumes, and flowers in their religious ceremonies; (4) their worship of the cow; (5) their use of the *Sadra* or Shirt, as a sacred garment; and of the kusti or cincture for the loins and the cap of two folds;—(6) their use of songs and music in their marriages; (7) ornaments and perfumes by their wives; (8) their charity and excavating of tanks and wells; (9) their sympathy with men and women; (10) their use of *gaomutra* one of the excretions of the cow; (11) their wearing the sacred girdle at prayer and eating; (12) their feeding the sacred flame with incense; (13) their practice of devotion five times a day; (14) their conjugal fidelity and purity; (15) annual religious rites on behalf of ancestors; and (16) their placing great restraints on their women, after child birth.

When death is drawing near, prior to the flight of the soul, the body of the dying person is washed and arrayed in fine clothes. After death, the remains are placed on an oblong piece of polished stone, laid on the floor, and the following morning, generally, replaced on

*Zars* or corpse bearers, who after prayers by the priests, carry it to the Dokhma or tower of silence.

The Dokhma is erected in a solitary place: those in Bombay being on the most secluded and highest parts of Malabar hill. Arrived at this place, the iron bier is placed on the ground, and a last look of the dead allowed by uncovering the face, and then removed within the tower, where exposed to the vultures and other carnivorous birds it is soon denuded of flesh, the bones fall through the iron grating into a pit beneath, from which they are afterwards removed into a subterranean entrance made for that purpose. Parsees meeting a dead body of a member of their tribe, bow to it.

These religionists perform annual ceremonies in memory of the dead, but on the "Furrohur din jasan" are performed the sacred rites of the friends who have died in long voyages or the precise date of whose demise is not ascertained.

The first act of Parsees, on their occupying any locality, is to erect this place, and it is known from this that their first settlement in Bombay was about the year 1671.

After the Mahomedan conquest of Persia, the Parsees, being persecuted by the Arabs, fled to the mountains of Khorassan, where they found a shelter for about a hundred years, but, being again compelled to flee from their enemies, they emigrated to the little island of Ormuz at the mouth of the Persian Gulf, and subsequently, from the same cause they quitted Ormuz for the western coast of India. According to the Kissa Sanjan, they first landed on the small island of Diu or Diew, in the Gulf of Cambay, lying to the south west of the Peninsula of Katiwar, which after a short residence of 19 years they again quitted for Guzerat, and landed at Damaun in A. D. 717.

It was here, at Sanjan, in A. D. 721, that the Parsees erected the first fire temple and saw the sacred flame kindled on its altar. They remained here, in peace, for about 300 years, small communities settling in other towns in Guzerat, but all engaged in cultivation. But, in 1507, having engaged in the cause of a Hindoo prince who sustained a defeat, they quitted Sanjan for the mountains of Baharout taking with them the sacred fire, from which it was subsequently removed to Nowsaree, and lately, owing to disputes among the priests, it was secretly removed to Oodwara, 32 miles south of Surat, where it still exists, and being the oldest fire temple of the Zoroastrians in India, it is held in the highest veneration. The remnant of the Parsees in Persia, is now almost confined to the town of Yezd and the twenty-four surrounding villages, and in 1854, there were there one thousand families, comprising a population of 6,658 souls, of whom 3,310 were men and 3,348 were

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tural pursuits. At Kirman the Parsees number about 450; in Teheran there are only about fifty merchants of this race. They have fire-temples but no ancient liturgical books.

The total number of this race of the present day, who are followers of Zoroaster, does not exceed 150,000 persons, and the census of the 20th August 1854 showed those of Bombay to amount to 110,544; of whom 68,754 were men and 41,790 were women.

More than half this number, viz. 61,298, of all this tribe in Bombay were merchants, bankers, or brokers.

In Western India they are a liberal minded and open handed race, and one of their number Sir Jamsetjee Jejeebhoy has given away sums, for public charities to the extent of £250,000.

## ZYE.

They have two sects, the Shensoys and Kudmis, whose only dissimilarity arises from their different mode of computing since 1746, the era of Yedezird which occasions a difference amongst the two sects in the time of celebrating their festivals. The numbers of the Shensoys ten times exceed those of the Kudmis.

It is a common notion that Parsees will not use fire arms, from their worshipping or venerating fire but this a mistake.—*The Parsees*, pages, 7, 8, 10, 12, 21, 25, 31, 37, 57, 61, 152, 236, 242, 259, 261.

(3058) ZYE, PUSHTOO. A term subjoined to several Affghan tribes, as the Ensoof Zye, the Baruk-Zye, and Hussain Zye.

THE END.

